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FLOODPLAIN DEVELOPMENT PRESSURES AND FEDERAL PROGRAMS

PART III
CASE STUDY REPORTS

Prepared for the

Office of Federal Activities
U.S. Environmental Protection Agency

June, 1978

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16. ABSTRACT

The individual and combined effects of federal programs on development in floodplains are identified. Based on those findings, ways sre recommended in which the '201' Wastewater Treatment Works Program of the Environmental Protection Agency can reduce floodplain development pressures. Major tasks in developing those recommendations:

(1) Thirty-one case studies of the impact of federal programs on floodplain development were completed in the Southeast, West and Midwest regions. Interviews with planning directors and other knowledgeable persons at the local government level provided the basic information;

(2) Meetings with the EPA Regional Offices in Atlanta, Kansas City and Denver were held to review present methods for implementing floodplain policy related to '201' wastewater treatment facilities;

(3) Federal programs which potentially can affect floodplain development were reviewed to identify the range of methods and approaches presently used to mitigate floodplain development pressures; and

(4) Major decision points in the '201' Wastewater Treatment Works Program which can affect floodplain impacts were identified, based on a review of program regulations and guidance materials.

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*Maps prepared by Donald W. Campbell

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PREFACE

Thirty-one case studies of floodplain development pressures and federal programs are documented in this report. The cases document the sequence of federal programs and the relationship of the programs to community development and floodplain development. All localities selected for the case studies were recipients of grants through the '201' Wastewater Treatment Works Program of The U.S. Environmental Protection Agency.

Case study reports are included in the section which follows. The following information about each case study is present:

- Location of the community;
- Population trends;
- Characteristics of the floodplain;
- Federal programs in the community;
- Effect of federal programs on floodplain development.

The map following each case study report illustrates the general location of the 100-year floodplain. The locations of major federal construction and development programs are indicated.

Case study information was obtained through interviews with local planning directors and other officials. The excellent assistance of the persons contacted was essential to the studies and is gratefully acknowledged.

TABLE OF CONTENTS

PAGE

CASE STUDIES IN THE ATLANTA REGION

Mill Creek Basin, Columbia, South Carolina 1
Batesburg and Leesville, South Carolina 5
Pocataligo River Basin, Sumter, South Carolina 9
Big Indian Creek Basin, Perry, Georgia 15
Rocky Creek and Tobosofkee Creek Basins, Macon, Ga.. 20
North Myrtle Beach, South Carolina 25
North Macon County, Alabama 29
Morning Creek Basin, Fulton County, Georgia 35
Buford and Sugar Hill, Georgia 39
Tybee Island, Georgia 44

CASE STUDIES IN THE KANSAS CITY REGION

York, Nebraska 48
Manhattan, Kansas 53
DeSoto, Kansas 58
Wamego, Kansas 63
Pleasant Hill, Missouri 69
Harlan, Iowa 73
Omaha, Nebraska 77
Davenport, Iowa 83
Council Bluffs, Iowa 89
North Kansas City, Kansas 95

CASE STUDIES IN THE DENVER REGION

Rock Springs, Wyoming 101
Hyrum, Utah 108
Wellsville, Utah 114
Missoula, Montana 119
Grand Junction, Colorado 125
DeSmet, South Dakota 130
Howard, South Dakota 134
Keystone, South Dakota 138
Monroe, South Dakota 142
Wasta, South Dakota 145
Rapid City, South Dakota 149

CASE STUDY OF DEVELOPMENT IN THE MILL CREEK BASIN, COLUMBIA, SOUTH CAROLINA*

The City of Columbia, South Carolina is the State capitol and largest City in the State. The City is located along the banks of the Congaree River. The present population of the City is 112,000 persons and the metropolitan area population is 384,000. Government employment is the largest employer in the metropolitan area. A number of small manufacturing, wholesale and retail establishments are also located in the City.

An expansive river swamp forms the floodplain along the Congaree River. In addition, numerous small creeks with small floodplains wind through the urban area. Whether large or small, the floodplains in the urban area are characterized by swampy, hardwood vegetation and poorly drained soils.

The City of Columbia owns and operates an extensive wastewater treatment system which services properties in the City. One project constructed with funds from the U.S. Environmental Protection Agency has been the Mill Creek interceptor project. The interceptor, constructed in 1972, follows the floodplain of Mill Creek southeast of the City. Because there is relatively little urban development in the floodplain adjacent to Mill Creek, the Mill Creek Basin was selected as the study area for this case example.

The Mill Creek area is a predominantly residential area with single family homes in the moderate to high income range. Prior to the construction of the Mill Creek interceptor connecting the area to the City of Columbia Metropolitan Wastewater Treatment Facility, individual subdivisions in the area had been serviced by package treatment plants. In 1970, the approximate population of the area was 6,000 persons. By 1976, the population had grown to 8,800 persons, or an increase of more than 30 percent. Although the interceptor was constructed to alleviate pollution problems resulting from the package treatment plants, the interceptor provides for service to both existing and potential future development in the Mill Creek Basin.

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*Case study based upon interview with Mr. Sidney F. Thomas, Executive Director; Mr. Robert Gossler, City of Columbia Planner; and Michael McAnelly, Environmental Planner; and Mr. Gregory Craxton, Environmental Planner; Central Midlands Regional Planning Council, Columbia, South Carolina, February 10, 1978.

The floodplains in the Mill Creek Basin are characterized by swampy vegetation and poorly drained soils. Branches of Mill Creek have been dammed in several areas to provide amenities for residential development. There is no development in the floodplain because the soils are wet.

Federal planning and construction programs which have taken place in the vicinity of the Mill Creek Basin are listed below in chronological order:

1970 - Federal-Aid Highway Program, U.S. Department of Transportation - resurfacing of U.S. Highway 76.

1971 to 1972 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of the Mill Creek interceptor and related improvements to the Columbia Metropolitan Wastewater Treatment Facility.

Ongoing - Federal-Aid Highway Program, U.S. Department of Transportation - planning activities to update the Columbia Area Transportation Plan are underway. Plans for the construction of the Beltway near the Mill Creek Basin are being made, and the extension of the Beltway will be constructed soon if funds are available.

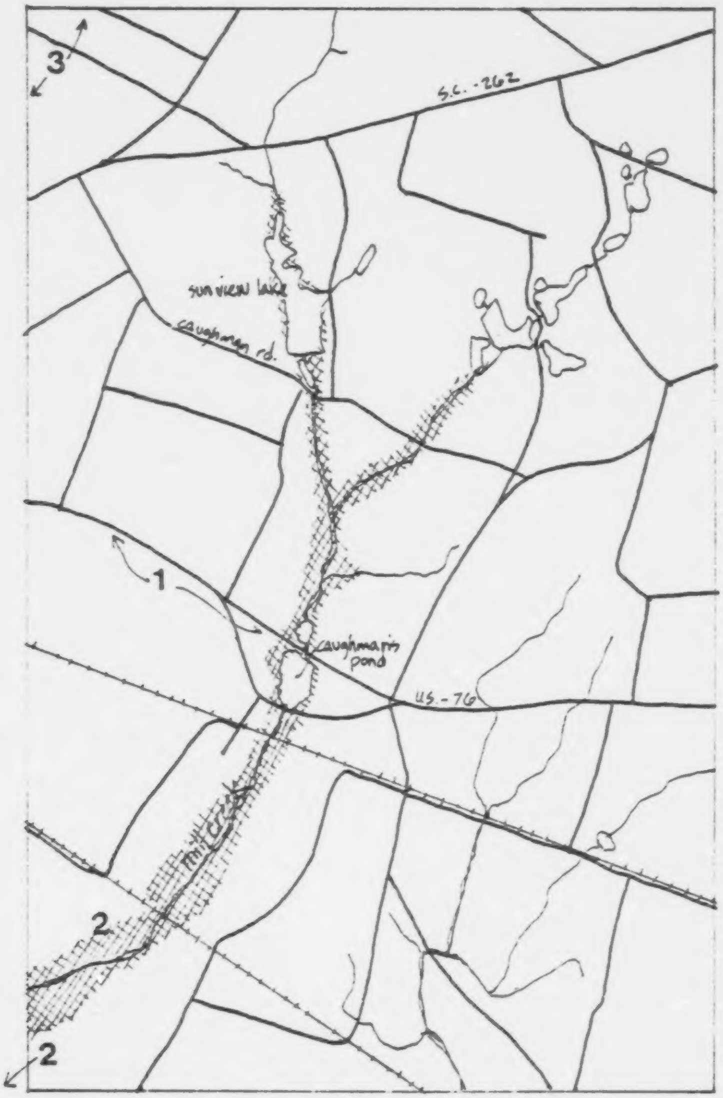
Few federal programs have taken place directly in or in the vicinity of the Mill Creek Basin.

The federal programs listed above to date have not had a major effect on the development in the Mill Creek Basin. The construction of the interceptor will permit higher density development than would otherwise be possible. However, even without sewer, residential development would take place in the area as it has in the past.

In the near future, however, construction of the Southeast Beltway could have a major impact on the Mill Creek Basin. The construction of the Beltway just to the west of the Basin will make a number of acres of undeveloped land very accessible to the metropolitan area and appropriate sites for industrial development. In addition to being accessible to major highways, the area is accessible to the railroads and the airport. Industrial prospects definitely exist and interest in that location has been clearly demonstrated. If industrial development occurs, demand for housing in the Mill Creek Basin area is expected to increase.

Future development in the Mill Creek Basin is definitely expected. Floodplain development is expected to be minimal, however, as a result of soil conditions and drainage problems.

Mill Creek Basin,
Columbia
South Carolina



Key:

1 - Resurfacing of U.S. Highway 76 (DOT)
2 - Wastewater treatment plant and
interceptor improvements (EPA)
3 - Proposed Southeast Beltway (DOT)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN BATESBURG AND LEESVILLE, SOUTH CAROLINA*

The Towns of Batesburg and Leesville are two neighboring communities located approximately 20 miles west of the City of Columbia, South Carolina. The Towns originally grew because of the railroad lines leading to Columbia. Today there are several industries which provide local employment, especially related to textile manufacturing.

All of Leesville and a major portion of Batesburg are located in Lexington County. A small portion of Batesburg is located in Saluda County. In 1960, the population of Batesburg was 3,806 persons; in 1970, the population was 4,036 persons; but in 1975, a decreasing population of 3,905 was estimated. Leesville is also an area of slow population growth. The 1960 population of 1,619 increased to 1,907 in 1970. In 1975, the population increased to 2,107. The 1975 combined population of the two Towns was approximately 6,000 persons.

The Towns are too distant from the City of Columbia to be experiencing urban growth pressures. The population and development in the area is expected to remain at its present level in the near future.

In 1972, a grant from the U.S. Environmental Protection Agency was received for the purpose of upgrading the North side Wastewater Treatment Plant servicing most of the area of Batesburg. In Leesville, an oxidation pond and septic tanks are used for waste disposal. Plans are underway for construction of a new wastewater treatment facility, however, which will service Batesburg, Leesville, and surrounding areas.

Floodplain areas near Batesburg and Leesville are adjacent to small creeks and intermittent streams characterized by wet soils and swampy vegetation. The Towns were built on a ridge, and only small portions of the Creeks are located in the Towns. Due to drainage problems, there is no urban development in the floodplains. Therefore, the expanded '201' facility planning area, including the Towns of Batesburg and Leesville, has been selected as the study area.

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*Information based on interview with Mr. Sidney F. Thomas, Executive Director; Mr. Douglas Phillips, Planner; and Mr. Gregory Croxton, Environmental Planner, Central Midlands Regional Planning Council, February 10, 1978.

The following federal planning and construction programs have taken place in Batesburg or Leesville:

1972 -	'201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - upgrading and additions to the Northside Wastewater Treatment Plant serving the Town of Batesburg.
1975 to 1977 -	Community Development Block Grant Porgram, U.S. Department of Housing and Urban Development - grant to the Town of Leesville to drill and locate producing water wells.
1976 -	Section 8 Housing Program, U.S. Department of Housing and Urban Development - construction of 60 units of low-income housing in Leesville.
1976 -	Industrial Development Grant, Farmers Home Administration, U.S. Department of Agriculture - construction of a pump station and force main to provide for sewer facilities to Hartwell Industries.
1977 to present -	National Flood Insurance Program, U.S. Department of Housing and Urban Development - floodplain mapping survey now in progress.
1977 -	Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of a Town Hall.
Ongoing -	'201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - Step 1 facilities planning for a new treatment facility serving Batesburg and Leesville is in progress.

The interceptor sewer from the existing Northside plant and the proposed interceptor from the new regional treatment plant are located in floodplain areas. None of the other federal programs are actually located in the floodplain.

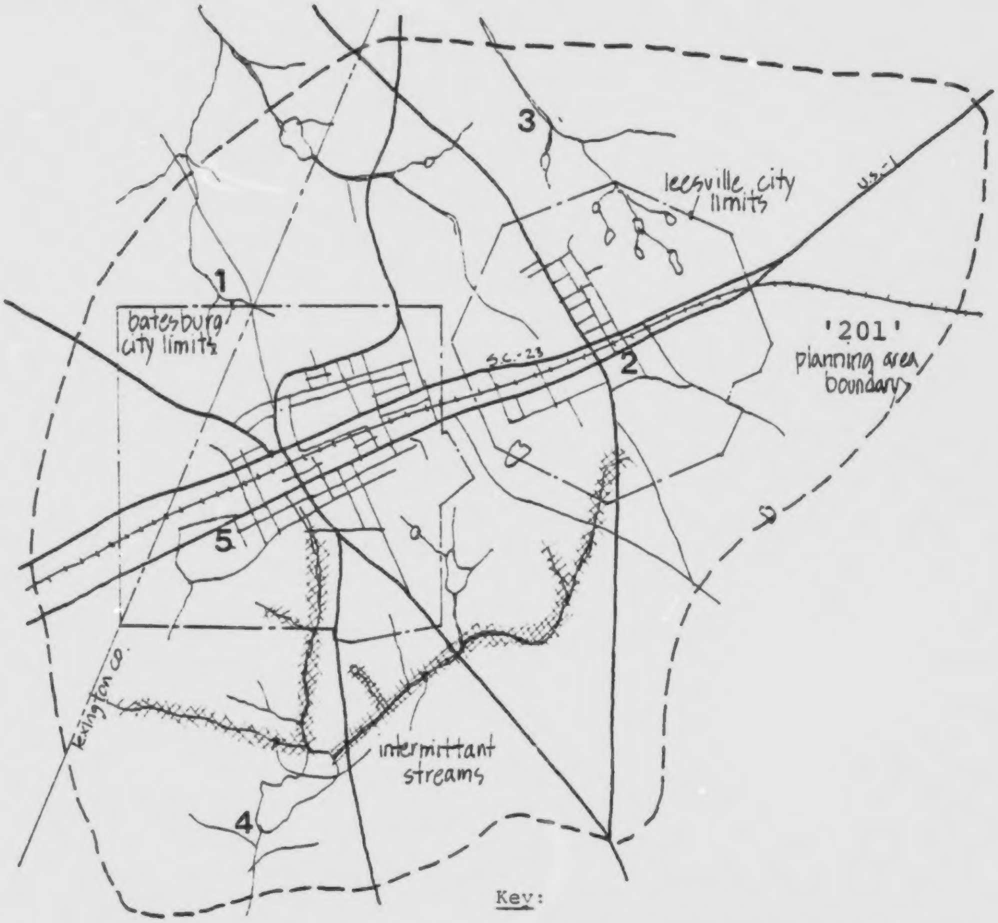
Officials in Leesville and Batesburg have undertaken a special local community planning effort in order to identify appropriate locations for the interceptor lines for the new treatment facility. Recognizing that the location of the sewer lines will influence the location of growth, officials have identified areas where growth would be most suitable.

None of the federal programs, however, including the new regional wastewater treatment facility, are expected to affect the magnitude of growth and development in the area. The location of development, however, will be influenced by the location of the sewer lines.

A major problem affecting growth and development in the Batesburg-Leesburg area is water supply. Additional capacity in the water system is needed in both communities. If industries wished to locate in the area, this might be a limitation. Although Community Development Block Grant funds from the U.S. Department of Housing and Urban Development were used to drill for new wells in Leesville, no useful water supplies which would enhance development potential were found.

In summary, development in the floodplain or outside of the floodplain is not expected to occur in the future. Federal programs have contributed to the well-being of existing community residents but are not factors encouraging urban development. The location of the new sewer interceptor line is recognized as a factor affecting the location of development. Due to the terrain and drainage problems, development in the floodplain is not expected, even though the interceptor is located in the floodplain.

Batesburg and Leesville, South Carolina



Key:

1 - Wastewater treatment plant (EPA)
2 - Low-income housing (HUD)
3 - Pump station and force main for Hartwell Industries (FHA)
4 - Site of new wastewater treatment plant (EPA)
5 - Town hall (EDA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE POCATALIGO RIVER BASIN, CITY OF SUMTER, SOUTH CAROLINA*

Sumter County is a rural county in east central South Carolina, located approximately 44 miles east of the City of Columbia. The City of Sumter is the largest City in the County and is located in the center of the County just off of Highways 76 and 378.

The economy of the City of Sumter and the urbanized portion of the County near the City is characterized by different types of economic activities, including manufacturing, wholesale trade, extractive industries, utilities, trucking terminals, and warehousing. Shaw Air Force Base, located in Sumter County just northwest of the City, is a major employer in the area.

Population in the City has been gradually increasing over the past decades. In 1960, the population of the City was 23,000 persons and in 1970, the population had increased to 24,500. Moderate growth occurred in the 1970-1977 period. In 1977, a population of 25,000 was reported. Subdivision development in the County has also gradually increased over the past ten years. Due to restrictive State annexation laws, most of the growth is occurring just outside the City limits. The 1970 population of Sumter County was 29,400 persons.

Floodplains in the City and County are poorly-drained areas with swamp vegetation and wet soils. Floodplains adjacent to creeks and rivers are of varying sizes, although some floodplains, such as the floodplain adjacent to the Pocataligo River, span a distance of 2,000 feet. Carolina Bays are special wetland and floodplain areas within the County. Carolina Bays are oval-shaped depressions, 10-15 feet deep, averaging one to two miles in length.

Only small areas of the floodplains in either the City or County have been developed. Some older development in the City of Sumter, including residential and commercial structures, is located in the floodplain. One residential subdivision is partially located in a Carolina Bay. For the most part, development has not occurred in the floodplain because higher, dryer lands are available and because growth has not been rapid.

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* Information based on interview with Mr. William McAllister, Director of Planning, Sumter City-County Planning Commission, February 9, 1978.

In order to protect water quality, the wastewater treatment facility funded through the '201' Wastewater Treatment Works Program was constructed approximately four miles southeast of the City of Sumter near the Pocataligo River. The treatment facility replaces an older treatment system and extends sewer service to areas previously not served. The treatment facility potentially can serve a large portion of the City of Sumter and developing areas of the County located south of the City. The City of Sumter which owns and operates the treatment facility, however, implemented a policy of not allowing hookups outside of the City limits many years ago and still maintains this posture as an inducement toward greater annexation.

Since the treatment facility services the Pocataligo River Basin and since little development is located in floodplain areas, the Pocataligo River Basin, including a large portion of the City of Sumter and the area of the County between the treatment plant and the City, was selected as the study area.

In chronological order, the following federal construction and planning funds have been used in Sumter and its environs:

1958 to 1960 -	Federal-Aid Highway Program, U.S. Department of Transportation - in-town bypass of downtown.
1963 -	Federal-Aid Highway Program, U.S. Department of Transportation - construction of bypass on U.S. Highways 76 and 378.
1970 -	Public Works Project for Flood Control, U.S. Army Corps of Engineers - construction of channel in Turkey Creek and Shot Pouch drainage area.
1970 to 1971	'701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - community land use planning grants.

1970 - '221-d-3' Housing Assistance Program, U.S. Department of Housing and Urban Development - construction of 120 units of multiple-family housing.

1973 - Urban Mass Transportation Program, U.S. Department of Transportation - bus garage construction and related improvements.

1974 to 1975 - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - acquisition of land and development of several community parks.

1975 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of water treatment facilities.

1975 - '236' Housing Assistance Program, U.S. Department of Housing and Urban Development - construction of 200 multiple-family units.

1975 to 1977 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of local government office building.

1976 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - construction of sewer and water collector lines to service approximately 230 homes outside the City.

1977 - Public Works Program, Economic Development Administration - construction of an exhibition hall.

1977 - Coastal Plains Regional Commission Project Grant - financial supplemental assistance for the construction of the exhibition hall.

1977 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of water tower and line.

1975 to 1977 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - grants to City of Sumter used for storm drainage and housing rehabilitation loans (among other projects).

1977 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - grant for construction of a recreational center.

1977 - Federal-Aid Highway Program, U.S. Department of Transportation - road widening on U.S. Highway 15 in northeast area of City.

Several additional types of programs have been administered through the Farmers Home Administration. The Farmers Home Administration has provided funds for the construction of water lines in urbanizing areas of the County near the City of Sumter. In addition, Sumter County led the nation's counties in the construction of homes under the '502' Housing Program during the early 1970's. As illustrated by this list, the City and County of Sumter have been extremely successful in obtaining federal funding for community projects.

Several of the federal projects are located in the floodplain areas. These include the following:

Low Income Public Housing - the public housing was constructed in the floodplain before the location of the 100-year floodplain was known.

Turkey Creek and Shot Pouch Construction - this project is located in the floodplain of necessity, since it is designed to provide for flood control.

Sewer Interceptor, '201' Wastewater Treatment Works Program - constructed in the floodplain of the Pocataligo River for cost and engineering reasons.

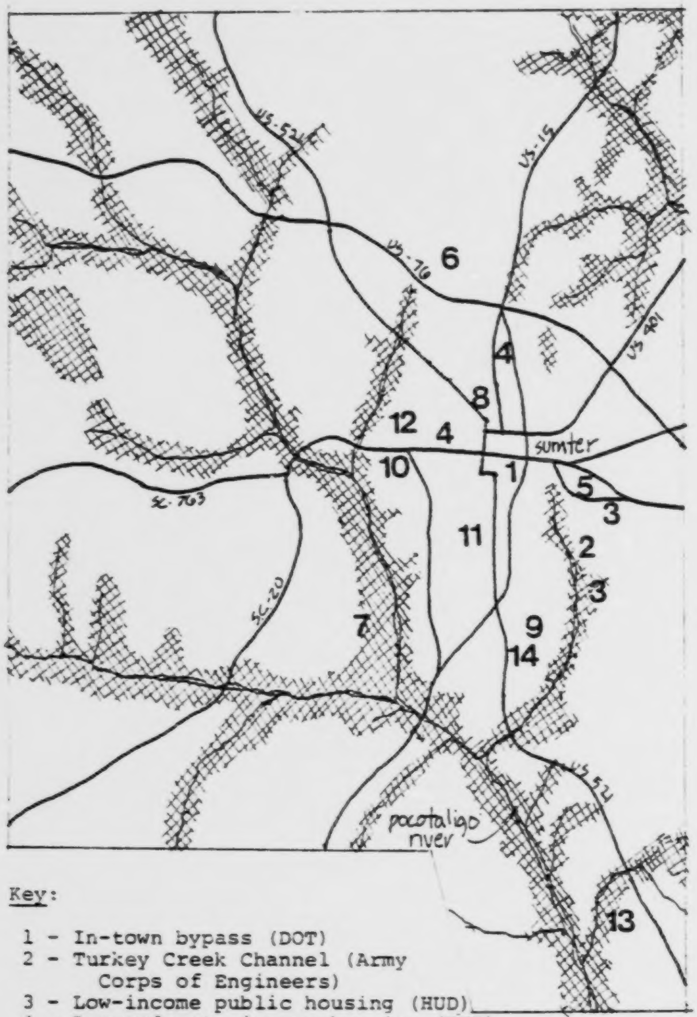
None of the federal programs, including programs constructed in the floodplain, have caused secondary urban development, either in the floodplain or in the adjacent areas. Residential and commercial development, for example, could occur with septic tanks, rather than sewer lines. Federal funds through various programs used for sewer construction have influenced the density and in some cases, location of development.

The growth and development of the community have been spurred by major new industries locating in the County and by the expansion of Shaw Air Force Base. Federal programs have provided essential community facilities which could not have been provided with local funds alone.

The City of Sumter is in the process of completing studies and adopting regulations as required by the National Flood Insurance Program. Although the regulations may place a 'cloud of uncertainty' on development proposals, a significant or long-term effect on development is not anticipated. Commercial and industrial structures, for example, may still be constructed in the floodplain if flood proofing requirements are met. Any use or structure may be constructed outside the central floodway if structures are elevated.

Floodplain development in the future is not anticipated to any great extent, primarily because of the terrain and soils which discourage development and the readily availablility of good developable lands elsewhere. Apart from the direct impact of federal projects located in the floodplain, federal programs in Sumter have no cause and effect relationship to urban development, either in or outside of the floodplain.

Sumter ,
South Carolina



Key:

1 - In-town bypass (DOT)
2 - Turkey Creek Channel (Army Corps of Engineers)
3 - Low-income public housing (HUD)
4 - Low-moderate income housing (HUD)
5 - Bus garage and improvements (DOT)
6 - City park (HCRS)
7 - Water treatment facilities (EDA)
8 - Low-moderate income housing (HUD)
9 - Sewer and water lines (HUD)
10 - Exhibition hall (EDA and CPRC)
11 - Storm drainage and housing rehab. (HUD)
12 - Highway 15 improvements (DOT)
13 - Wastewater treatment plant & intercpr. (EPA)
14 - Water tower and lines (EDA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN PERRY, GEORGIA*

The City of Perry, Georgia is a small city of 12,700 persons located in central Georgia approximately twenty-five miles south of the City of Macon. Recent industrial development in the area has centered around textile and timber industries. Warner-Robins, a major U.S. Air Force Base, is located twenty-two miles northeast of the City and is the major employer in the area. One out of every five residents in the City of Perry is employed by Warner-Robins.

The City of Perry experienced little growth in the 1960's. Between 1960 and 1970, the population increased from 6,030 persons to 7,770 persons. Between 1970 and 1977, however, the population increased 65 percent, with a population of 12,700 reported in 1977.

The City of Perry is located in the drainage basin of Big Indian Creek. The Creek and several tributaries flow directly through the City. The floodplains adjacent to Big Indian Creek are low-lying, flat bottomland hardwood areas, spanning a distance of from 100 to 200 feet on either side of the Creek.

In part because of the wet soils and occasional flooding and in part because of the floodplain regulations of the City of Perry, little urban development has taken place in the floodplain. Some commercial and industrial buildings are located in the floodplain, especially along the highways and railroad crossings.

Since the floodplain in the City of Perry is narrow, with development occurring outside the floodplain, and since the wastewater treatment plant serves a major area of the City of Perry, the City limits were selected as the boundaries for the case study.

Federal planning and construction programs which have taken place in the City of Perry are:

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* Case study based on an interview with Mr. Charles H. Howell, Executive Director, and Mr. Martin Matragano, Senior Planner, Middle Georgia Area Planning and Development Commission, Macon, Georgia, January 25, 1978.

1963 to 1968 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - planning funds have been received by the City for the preparation of a comprehensive land use plan.

1964 - Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate 75.

1970 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - Floodplain development ordinance adopted by the City of Perry.

1971 - Sewer and Water Facility Program, U.S. Department of Housing and Urban Development - construction of a public water system serving a large area of the City of Perry.

1971 - Grant from the Federal Water Quality Administration, U.S. Department of the Interior (now the U.S. Environmental Protection Agency) - construction of a wastewater treatment plant.

1974 - Floodplain information study prepared by the U.S. Army Corps of Engineers for the City of Perry.

1974 - '221-d-4' Housing Assistance Program, U.S. Department of Housing and Urban Development - construction of 60 units of low-moderate income housing.

1975 - Housing Assistance Programs, U.S. Department of Housing and Urban Development - construction of 20 units of multiple-family housing for low-moderate income families.

1975 - Community Development Block Program, U.S. Department of Housing and Urban Development - completion of downtown improvement project and a number of small projects throughout the City such as street lights and paving.

1977 - '201' Wastewater Treatment Work Program, U.S. Environmental Protection Agency - expansion of the wastewater treatment facility which is presently overloaded.

1977 - Section 8 Housing Assistance Program, U.S. Department of Housing and Urban Development.

The population of the City of Perry nearly doubled in the 1970-1977 period, which is also the time that many of the federal projects were funded.

Based upon the experience and observations of the regional planners interviewed, the continued federal activity at Warner-Robins Air Force Base has been the primary factor generating urban development in the City of Perry. Although employment at the Air Force Base has not expanded significantly in the past ten years, new employees moving into the region to replace persons leaving positions at the Base have been attracted to Perry as a place to live.

The excellent direct access to Warner-Robins Air Force Base via Interstate Highway 75 has been a major factor leading to the development of the City of Perry. Without good transportation, the 20 miles commuting distance might have been a constraint for Warner-Robins employees.

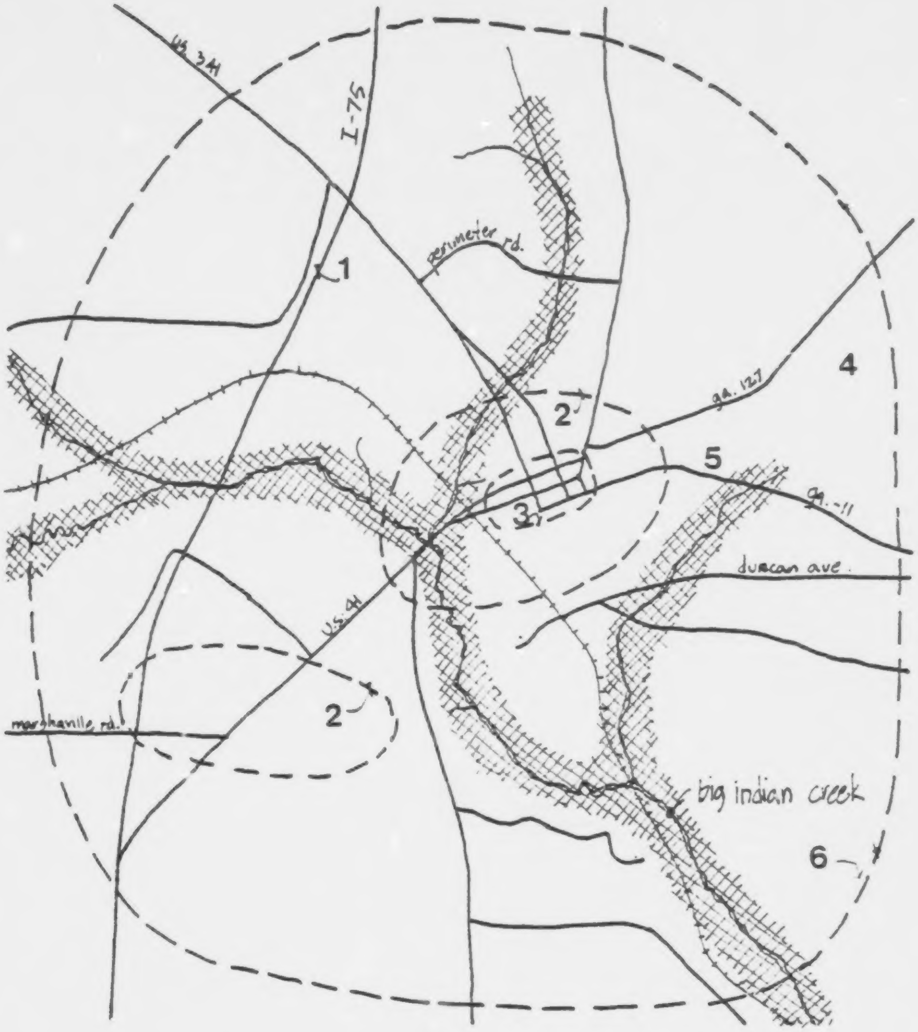
A third factor facilitating the development of the City of Perry is the presence of sewer and water facilities. Although urban development in the City can take place with septic tanks, soils and State of Georgia regulations make intensive urban development difficult. A City-maintained water system, rather than private wells, is also necessary to serve sizeable urban development.

The first federal assistance for wastewater treatment facilities was received in 1971. Federal financial assistance for the construction of water facilities was received in the same year. The presence of sewer and water facilities have been factors directing development to locations within the City limits. The City water and sewer systems provide service to nearly all developed and developing areas of the City.

Finally, the improvement of the central business district, facilitated through the 1975 Community Development Block Grant, has been somewhat of a factor encouraging urban development. The improvement of the visual amenities of the downtown area is believed to be attracting new residents to the area as well as strengthening the business potential of the downtown area.

These four factors have influenced the growth and development of the City of Perry as a whole and are the pressures encouraging floodplain development. Due to the natural terrain and the floodplain regulations of the City of Perry, however, little development in the floodplain has taken place in the past and little is expected in the future.

Perry,
Georgia



Key:

- 1 - Interstate 75 (DOT)
- 2 - Public water system (HUD)
- 3 - Business district improvements (HUD)
- 4 - Low-moderate income housing (HUD)
- 5 - Low-moderate income housing (HUD)
- 6 - Wastewater treatment facility service area (EPA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE ROCKY CREEK AND TOBESOFKEE CREEK DRAINAGE BASINS, CITY OF MACON AND BIBB COUNTY, GEORGIA*

Bibb County is a rapidly growing county in central Georgia, located on Interstate Highway 75 approximately 75 miles south of the City of Atlanta. The City of Macon is located in Bibb County.

Bibb County is a small metropolitan area which has experienced slow but steady growth in the past twenty years. The 1976 population totaled 149,000. The industrial base of the County is diversified, with a variety of types of manufacturing operations. Warner-Robins Air Force Base located twenty miles south of the City of Macon is a major employer.

The Tobesofkee Creek and Rocky Creek drainage areas are located in the western area of Bibb County and include a small portion of the City of Macon. The drainage area of the creeks covers approximately 72,000 acres. A small additional 18,000 acres of the drainage basins are located in Monroe County, to the northwest of Bibb County.

The study area selected for detailed examination includes all of the drainage area of the two creeks located in Bibb County. This area will be served by the Rocky Creek wastewater treatment plant when the Tobesofkee Creek interceptor construction is completed. A portion of the area is presently served by the Rocky Creek treatment plant and by a small package treatment plant near Lake Tobesofkee.

The floodplain adjacent to Tobesofkee Creek and Rocky Creek is a bottomland hardwood river swamp forest, frequently inundated with water. The width of the floodplain ranges from 1,500 feet to more than 6,000 feet in places. In the western portion of the County, a dam on Tobesofkee Creek forms Tobesofkee Lake, owned and maintained by Bibb County. The Lake is an important recreational site.

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* Case study based upon interview with Mr. John Holley, Executive Director, Mr. James Wilbanks, '208' Project Director, Mr. Vernon Ryle, Planning Director, and Mr. Donald Tussing, Senior Planner, Macon-Bibb County Planning and Zoning Commission, Macon, Georgia, January 25, 1978.

Due to the wet soils and heavy flooding and due to floodplain regulations enforced within the City of Macon, little urban development has taken place in the floodplain. A small amount of commercial development, however, is located in the floodplain where U.S. Highway 41 crosses Tobesofkee Creek.

Development in the City of Macon and Bibb County is expanding in the Rocky Creek and Tobesofkee Creek Drainage Basins. In 1975 a total population of 70,000 persons lived in the Basins.

Large-lot, upper income homes surround Lake Tobesofkee. One smaller-lot subdivision is located at the eastern end of the Lake, serviced by the package treatment plant. The area between the Lake and Interstate 475 is largely undeveloped.

Federal planning and construction programs which have taken place in the Rocky Creek and Tobesofkee Creek drainage basins include:

1965 to present - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - a series of planning assistance grants have been received by the City of Macon.

1968 to 1972 - Federal-Aid Highway Program, U.S. Department of Transportation - reconstruction of U.S. Highway 80.

1969 to 1971 - '235' Housing Assistance Program, Federal Housing Administration, U.S. Department of Housing and Urban Development - moderate income housing subsidies.

1969 to 1970 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - adoption of floodplain regulations by the City of Macon and Bibb County, in part in response to the national program.

1969 to 1970 - Federal-Aid Program, U.S. Department of Transportation - completion of Interstate 475 near Macon.

1969 - Construction of the dam creating Lake Tobesofkee, completed by the Soil Conservation District for Bibb County. The local share of project construction was funded through a loan from the Farmers Home Administration.

1970 - Floodplain information study completed by the U.S. Army Corps of Engineers for Rocky and Wolf Creeks.

1971 to 1972 - Federal-Aid Highway Program, U.S. Department of Transportation - completion of Interstate 475 near Macon.

1971 - Grant from the Federal Water Quality Administration, U.S. Department of the Interior (now the U.S. Environmental Protection Agency) - major expansion of the Rocky Creek Wastewater Treatment Plant.

1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction grant for the Tobesofkee Creek interceptor and pump stations, connecting the Lake Tobesofkee area with the Rocky Creek Treatment Plant.

According to the City-County planners interviewed, a combination of federally-funded transportation projects and water and sewer facilities have encouraged urban development in the Rocky Creek and Tobesofkee Creek Basins.

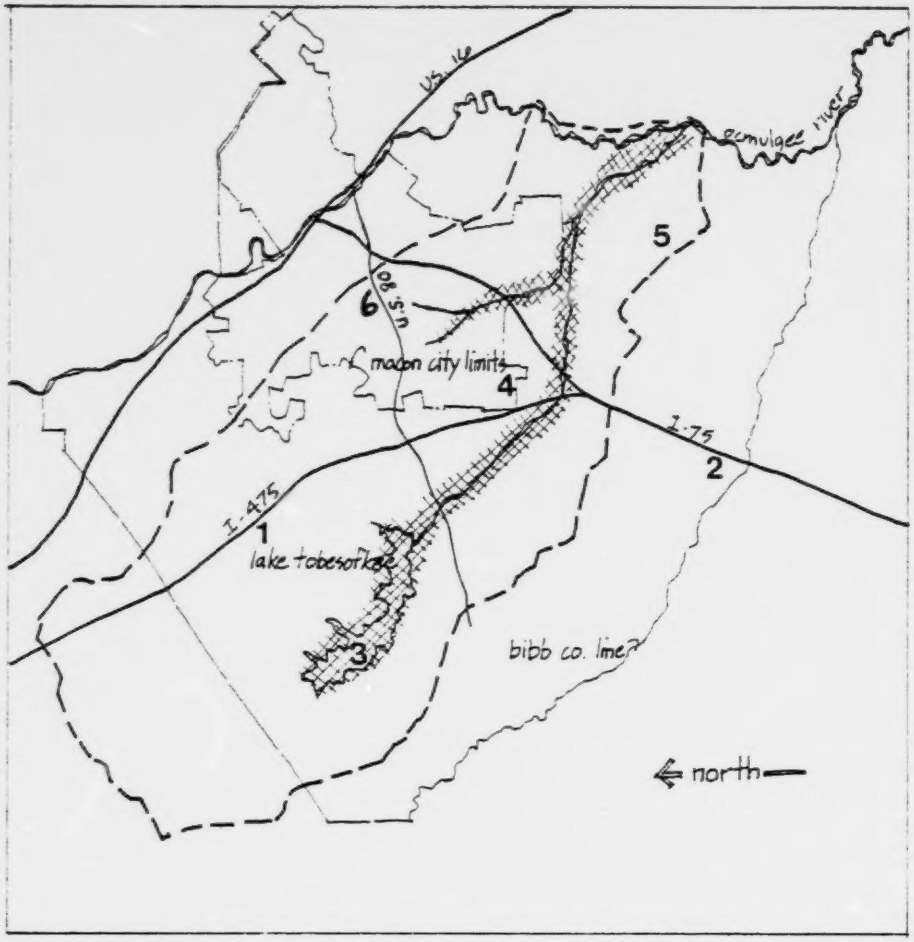
The construction of U.S. Highway 80 has been an important factor in the development of the western portion of the County adjacent to Lake Tobesofkee, since it provides good access to downtown Macon. The completion of Highway 475 as a bypass around Macon has also assisted persons living in the drainage basins to reach other sections of the County.

The provision of wastewater treatment facilities through the construction of the Tobesofkee Creek interceptor has also been an important factor in encouraging development in the area. Without the sewage treatment facilities, subdivision of land into small lots would not be possible. In the view of the planners, however, the wastewater treatment facilities alone would not have encouraged urban development; good highway access was also needed.

Although the construction of Lake Tobesofkee was a Soil Conservation Service project assisted with a loan from the Farmers Home Administration, the Lake itself is not considered to be a major force encouraging urban development in the drainage basin. The Lake serves as an amenity, attracting high-income residents to the area.

The combination of excellent transportation access and sewage treatment facilities are creating development pressures in the floodplain as well as upland areas outside of the floodplain. Due to the natural conditions and flooding in the floodplain, however, future development is not anticipated.

City of Macon and Bibb County, Georgia



Key:

1 - Interstate 475 (DOT)
2 - Interstate 75 (DOT)
3 - Lake Tobosofkee (FHA)
4 - Low-moderate income housing (HUD)
5 - Wastewater treatment plant (EPA)
6 - U.S. Highway 80 (DOT)

--- - Drainage basin and service area for wastewater treatment plant
▨ - FLOODPLAIN

CASE STUDY OF FLOODPLAIN DEVELOPMENT IN THE TOWN OF NORTH MYRTLE BEACH, SOUTH CAROLINA*

The Town of North Myrtle Beach is a coastal resort town located in the northeastern corner of South Carolina. North Myrtle Beach is five miles northeast of Myrtle Beach.

The Town of North Myrtle Beach was formed in 1968 when four small municipalities along the Atlantic shore consolidated. In 1970, the population of the Town was 1,800. By 1975, the permanent population had increased 79 percent to 3,200 persons. During peak days of the summer when tourism is at its height, the population of North Myrtle Beach swells to as high as 60,000-70,000 persons in a day.

These high peak day totals reflect the importance of tourism to the North Myrtle Beach economy. In addition to tourists and temporary residents, the Town is growing as a retirement community.

North Myrtle Beach is located on the northern end of an unbroken beach, 57 miles in length, known as the Grand Strand. The floodplain includes all beach areas and one block of development inland from the shore. A portion of the floodplain is tidal wetlands located just behind the beach line. The entire floodplain was selected as the study for this case example.

Since 1968 when the Town of North Myrtle Beach was created, growth has been rapid. According to the town building official, more than $50 million in construction has taken place. The major portion of the development, however, has really been higher density redevelopment of the center of the Town adjacent to the Atlantic Ocean. A number of condominium and hotel units have been constructed, replacing low-rise structures. At present, the floodplain is approximately 75 percent developed.

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* Case study based upon an interview with Mr. Charles Chestnut, Fire Chief and Building Official of North Myrtle Beach; Mr. Frank Clary, Water and Sewer Superintendent, Town of North Myrtle Beach; Mr. Dale McAllister, Planning Staff; and Mr. Jim Harrison, Assistant Director of Planning, Waccamaw Regional Planning and Development Council, February 9, 1978.

In 1972-1974 major improvements to the wastewater treatment facility, including an extension of the interceptor, were completed. A major portion of the area serviced by the facilities was already developed. In addition, the sewer facilities are available in some undeveloped areas. Plans for a new regional treatment facility are now being prepared.

Federal planning and construction programs which have taken place in North Myrtle Beach are listed below:

1970's - Federal-Aid Highway Program, U.S. Department of Transportation - road widening, sidewalk and storm drain construction along Ocean Drive, the major access route in North Myrtle Beach.

1975 - '701' Comprehensive Planning Program, U.S. Department of Housing and Urban Development - a land use plan, housing element, and zoning ordinance were prepared in 1976.

1972 1974 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - extensions of the interceptor and collection system in the floodplain and major improvements to the Town's wastewater treatment plant.

1977 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - adoption of a flood prevention ordinance in accordance with federal requirements.

Ongoing - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - the Town of North Myrtle Beach is participating with several other communities in a facility planning study for a regional treatment plant.

Ongoing - '208' Areawide Water Quality Management Program - an areawide water quality management plan which will include the Town of North Myrtle Beach is being prepared by the Waccamaw Regional Planning and Development Council.

All of these programs, with the exception of the Federal-Aid Highway Program, have actually been located in the floodplain.

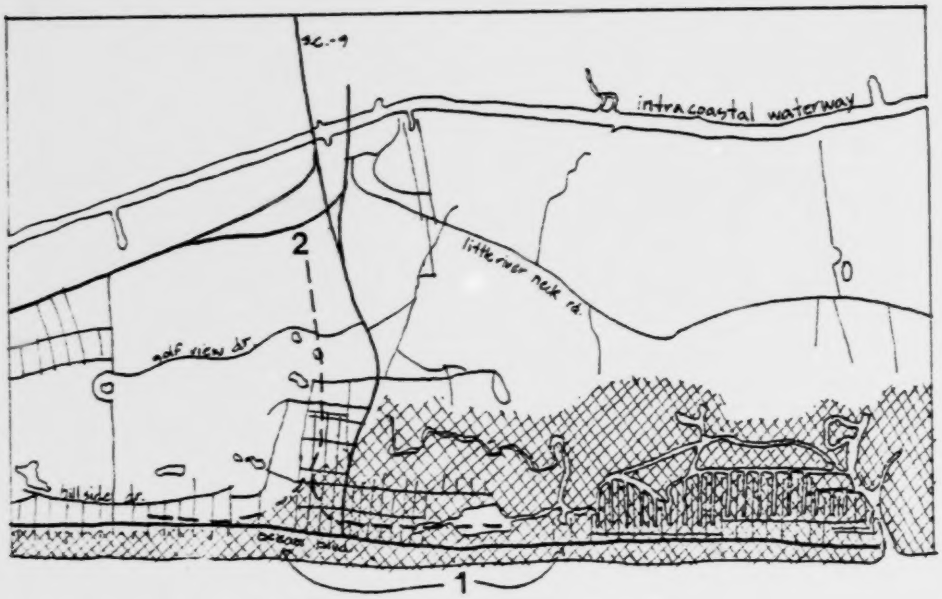
The '701' and '208' planning programs and the National Flood Insurance Program have and are assisting the Town of North Myrtle Beach in planning for the growth that is taking place so that environmental damage is minimized. These programs have not caused or reduced urban development in the floodplain.

The '201' program plans and improvements to the wastewater treatment facility and the highway improvements on Ocean Drive have, in part, been necessitated by the growing population. The federal programs, however, have not caused urban growth and development in the floodplain. The cause of the growth in the floodplain along the ocean shore has been the increasing interest of Americans in the leisure time activities and the resulting tourism pressures.

A preliminary review of development trends and sewer construction suggests that a cause and effect relationship may have been present. In 1972, the interceptor sewer was extended to the northern area of the Beach. Between 1974 and 1978, the number of single-family structures at the north end of North Myrtle Beach increased from 2,000 to 2,400. However, as officials for the Town indicated, the development could have taken place even without sewer facilities, since septic tanks are suitable for the sandy soils. For high-density development, small oxidation ponds would have been constructed if wastewater treatment service were not available.

In conclusion, federal planning and construction programs have taken place along the shoreline of North Myrtle Beach but have not induced or restrained growth and development. Although several planning programs and the National Flood Insurance Program have led to local government plans and regulations for controlling the type of development, these regulations have not altered the trend toward growth. Increasing tourism and retirement homes have been the primary stimulus to development. Although some future development in floodplain areas which are not environmentally sensitive is expected, federal programs are not related to the growth trends.

North Myrtle Beach,
South Carolina



Key:

1 - Ocean Drive Improvements (DOT)
2 - Wastewater treatment plant
and interceptor (EPA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT
IN
NORTH MACON COUNTY, ALABAMA*

Macon County, Alabama is a rural county located 25 miles east of Montgomery, Alabama. The City of Tuskegee, the home of the Tuskegee Institute, is located in Macon County.

In 1970, the population of Macon County was 24,800 and the population of the City of Tuskegee was 11,000. The 1970 population was a 7 percent decrease from 1960 population figures. Between 1970 and 1975, a small population increase was experienced. In 1975, the population of Macon County was estimated at 25,900 persons and the City of Tuskegee was estimated at 12,000 persons. The City of Tuskegee accounts for nearly half of the population of the County.

Population growth in Macon County, however, is expected to increase dramatically when a new oil refinery and new town are constructed on a 200-acre site about 6 miles northwest of the City of Tuskegee. Wallace & Wallace Chemical and Oil Corporation plans to construct an oil refinery complex which will provide 1,300-1,800 permanent jobs. The new town ultimately will provide housing for over 3,000 persons and will include recreational areas, an office complex, neighborhood shopping, schools, and the General Daniel 'Chappie' James Airmen and Industrial Museum. Detailed site plans for the oil refinery and new town project have just about been completed and construction is expected later this year.

Major expansion of the City of Tuskegee wastewater treatment facilities is being planned to accommodate the existing development in the City of Tuskegee and the Wallace & Wallace new town development. As shown on the attached map, construction of the interceptor and the North Sewage Treatment Plant will provide service to a substantial area of the County which is now undeveloped.

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* Information for this case study was provided by Mr. Lewis Duckworth, Executive Director; Mr. Michael Wilson, Planning Director; and Mr. William Harris, Economic Planner, South Central Alabama Development Commission, Montgomery, Alabama, January 26, 1978.

The treatment facility replaces oxidation ponds. The service area of the expanded wastewater treatment facilities has been selected as the case study area for detailed examination.

Between 1970 and 1975, some urban development took place just north of the City of Tuskegee, including residential subdivisions and completion of an industrial park. Although roads, sewer and water are available, no industries are located in the industrial park at this time. Other portions of the study area are largely undeveloped, characterized by scattered homes. Moton Field is a small County-operated airport located approximately two miles north of the City of Tuskegee.

Uphapee Creek bisects the study area. The Creek is a small waterway which winds through the County. The adjacent floodplain is predominantly bottomland hardwood river swamp, characterized by wet soils, thick vegetation, and periodic flooding.

The floodplain adjacent to Uphapee Creek is largely undeveloped. A major portion of Moton Field, however, is located in the floodplain. Development related to Moton Field includes the runways and several airport hangers and buildings. Due to wet soils and frequent flooding, floodplain development in the future is not anticipated.

Major federal construction and planning funds received by Macon County and the City of Tuskegee are listed below in chronological order:

1964 - to 1975	Model Cities Program, U.S. Department of Housing and Urban Development - grants to the City of Tuskegee for planning, housing, community development, water and sewer construction and other programs.
1965 - and 1967	Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate 85 and interchanges in Macon County completed.
1967 - and 1968	Hill Burton Construction Program, U.S. Department of Health, Education and Welfare, and Public Works Program, U.S. Economic Development Administration - grants to Tuskegee Institute for hospital construction.

1969 - Public Works Program, U.S. Economic Development Administration - grant for construction of water treatment plant and sewage lines in the City of Tuskegee.

1969 - Wastewater treatment facilities grant from the Federal Water Quality Administration (now the U.S. Environmental Protection Agency) and the Public Works Program, Economic Development Administration, U.S. Department of Commerce - joint grant to the City of Tuskegee.

1972 - Water and Sewer Loan Program, Farmers Home Administration, U.S. Department of Agriculture - water system construction loan to the City of Tuskegee.

1970's-'701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - planning grants received by Macon County and the City of Tuskegee.

1972 - Neighborhood Development Program, U.S. Department of Housing and Urban Development - grant to the City of Tuskegee (used to fund neighborhood planning and rehabilitation).

1973 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - grant to Macon County to provide for the construction of an industrial park (including water line extensions, site preparation, and road construction).

1974 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - grant to the City of Tuskegee for a feasibility study for a Black Center.

1975 - Community Facilities Program, Farmers Home Administration, U.S. Department of Agriculture - loan for water system improvements to serve the Town of Notasulga and an area just south of the Town.

1976 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - grant to the County matched by funds from Wallace-Wallace Enterprises for the completion of a master plan for the new town.

1976 and 1977 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - grants to the City of Tuskegee used for a wide range of projects, including comprehensive planning, sewer and water line improvements, housing improvements, park improvements, street improvements, construction of a community center for the elderly, and many others.

1975 to 1977 - Land and Water Conservation Fund, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation), U.S. Department of the Interior - road construction and park facilities around Lake Tuskegee.

1977 - Health Manpower Construction Program, U.S. Department of Health, Education and Welfare - grant to Tuskegee Institute for the construction of veterinary school facilities.

1977 - Airport Development Aid Program, Federal Aviation Administration, U.S. Department of Transportation - construction grant for airport improvements at Moton Field.

As expressed by the planners interviewed, federal funds have "rained" on the City of Tuskegee.

Federal programs to date have not encouraged urban development in the Tuskegee area. Although Tuskegee Institute, the Veterans Administration Hospital, and Moton Airfield provide for employment in the area and have received federal grants, the grants have been used to expand existing facilities. The employment base has not been dependent upon these federal facilities. The industrial park funded by the Economic Development Administration has had no effect to date on development since no industries are located at the site.

Water and sewer facilities have, however, influenced the location of certain developments. For example, the industrial park is located near sewer and water facilities. Water and sewer facilities have also permitted higher density residential development in subdivisions north of the City of Tuskegee than would otherwise have been possible.

Federal programs have helped to stem outmigration and the economic problems in the region. As previously described, the outmigration trend in 1960 was turned around in the 1970's. Federal programs related to water and sewer facilities, community development, and economic development have helped to make Tuskegee and north Macon County an attractive place to live.

According to Mr. Keith Jackson, Vice-President of Wallace & Wallace Enterprises, federal programs have not had any effect on the decision of the firm to undertake the oil refinery and new town development.[1] If a public wastewater treatment system was not available for the new town, the company would make plans for the use of an existing wastewater treatment system. The new town will, however, make use of the wastewater treatment facilities after they are constructed. The '701' funds from the U.S. Department of Housing and Urban Development were useful, but were not a major factor influencing the development decision of the firm.

In summary, natural features have made urban development in the floodplain difficult. Even when growth in north Macon County increases, development in the floodplain is not expected. Federal programs to date have had an influence on the quality of community life but have not been major forces encouraging growth and development to take place.

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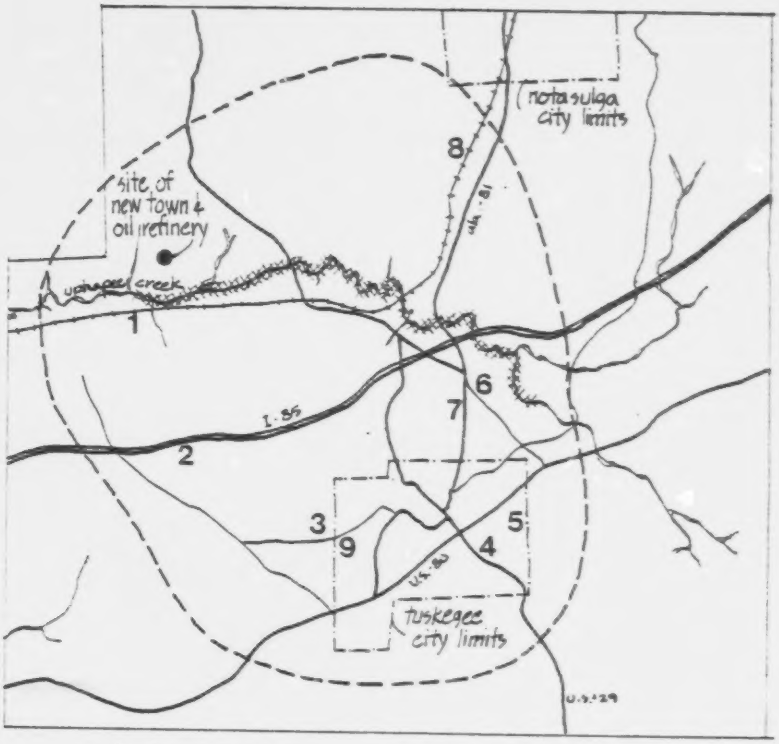
[1] Telephone interview with Mr. Keith Jackson, Vice-President, Wallace-Wallace Enterprises, Washington, D.C., March 9, 1978, and written communication, April 3, 1978.

North Macon County, Alabama



Key:

1 - Interceptor sewer (EPA)
2 - U.S. Highway 85 (DOT)
3 - Veterinary school buildings (HEW)
4 - Housing, sewer and water, and other community improvements in Tuskegee (HUD)
5 - Tuskegee Lake improvements (HCRS)
6 - Airport improvements (FAA)
7 - Industrial park (EDA)
8 - Water system improvements (FHA)
9 - Hospital construction (HEW & EDA)

▩ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE MORNING CREEK BASIN, FULTON COUNTY, GEORGIA*

Fulton County, Georgia, is a rapidly growing county in the Atlanta metropolitan area. The County extends north and south of the City of Atlanta and is characterized by rolling hills, rivers and streams. The site selected for study, called the Morning Creek Basin, is located in the southwestern corner of the County, approximately two miles south of Hartsfield International Airport, and adjacent to Interstate 85.

The floodplains associated with the Morning Creek Basin are narrow stream channels and valleys which wind through the Basin, characterized by steep slopes and thick vegetation. As a result of the steep terrain in the floodplains and the drainage requirements administered by the Fulton County Planning Department, very little development has actually occurred in floodplain areas. Therefore, the area selected for examination includes the entire Basin area served by the Morning Creek treatment plant.

Morning Creek Basin is a developing residential area. Although there are some older, commercial developments in the area, the Basin is primarily a medium density, residential area. Single-family homes for moderate income families are typical.

Substantial residential development of the area took place in the 1960's, reflecting growth trends in the Atlanta metropolitan area. Considerable growth has also taken place in the 1970's. Between 1971 and 1977, the resident population of the Basin grew from approximately 7,500 persons to 12,200 persons. An estimated 70 percent of the Basin is undeveloped.

In chronological order, the following federal activities and programs have affected Morning Creek Basin:

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* Information provided by Mr. William Ross, Principal Planner and Mr. James Kambourian, Senior Planner, Fulton County Department of Planning, Atlanta, Georgia, January 23, 1978. Mr. James Rigby of the Fulton County Public Works Department was also consulted.

1971 - Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate 85 traversing the Basin.

1972 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - adoption of drainage regulations by Fulton County Commission in compliance with the requirements.

1975 - '201' Wastewater Treatment Works Program U.S. Environmental Protection Agency - construction of a treatment plant, and interceptor for Morning Creek Basin.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of Cater Creek Pumping Station and outfall.

1977 - Public Works Program, U.S. Economic Development Administration - construction of a community fire station.

1977 to date - Federal-Aid Highway Program, U.S. Department of Transporation - widening of Old National Highway.

1977 to date - Urban Mass Transportation Program, U.S. Department of Transportation - planning for bus shelter and parking area.

Several projects involving the Federal-Aid Highway Program are anticipated in the near future. Projects include the widening of Jonesboro Road and reconstruction of Interstate 85 necessitated by airport expansions.

All of the federal projects listed above were constructed during the 1970's when rapid growth was occurring in the Morning Creek Basin. However, as noted above, more than fifty percent of the present population resided in the Basin in 1970.

In the opinions of County planners interviewed, the federal projects which contributed the most to development patterns in the area were (1) the construction of the Morning Creek wastewater treatment plant and interceptor; and (2) the completion of Interstate 85 which provided rapid access to downtown Atlanta. Each of these factors and their relationship to other development pressures is described below.

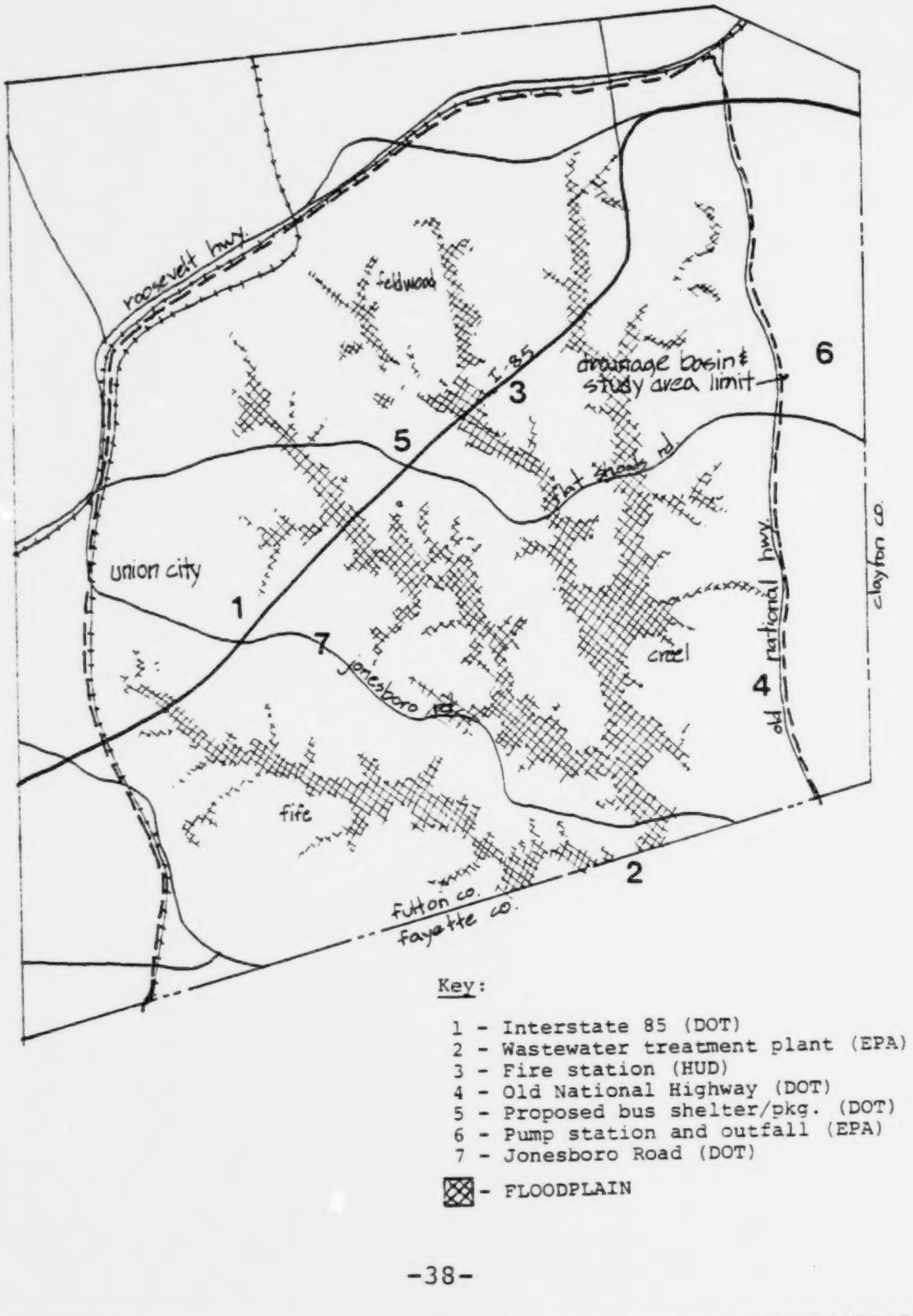
The Morning Creek Treatment Plant, completed in 1975, replaced an oxidation pond formerly located at the site. The availability of sewage treatment services, first through the oxidation pond and then as a result of the treatment plant, made it possible for developers to subdivide land into smaller lots.

The location of the Morning Creek Basin is good from a development standpoint, since it is close to Hartsfield International Airport, several major automobile plants, and numerous other commercial and industrial establishments. The proximity of Interstate 85 is especially important, since it provides easy access to downtown Atlanta. The completion of the Interstate Highway continues to make development of the area economically viable.

County planners emphasized the inter-dependence of the federally-financed projects and economic forces in making urban development of the Basin possible. The availability of sewage treatment facilities and easy access make the area attractive for development. At the same time, the growing population of the area makes adequate wastewater treatment services essential. Fulton County planners do not believe that either I-85 or the construction of the Morning Creek Wastewater Treatment Plant strongly encourage urban development.

The natural characteristics of the floodplain as well as the flood protection regulations of Fulton County have directed residential development to other areas of the Basin. Floodplain development in the future is not expected.

Morning Creek Basin
Fulton Co.,
Georgia



Key:

1 - Interstate 85 (DOT)
2 - Wastewater treatment plant (EPA)
3 - Fire station (HUD)
4 - Old National Highway (DOT)
5 - Proposed bus shelter/pkg. (DOT)
6 - Pump station and outfall (EPA)
7 - Jonesboro Road (DOT)
▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE CITIES OF BUFORD AND SUGAR HILL, GEORGIA*

Buford and Sugar Hill are two incorporated municipalities located in the northwestern section of Gwinnett County, Georgia. The cities are adjacent to each other, and are linked to the Atlanta area by Peachtree Industrial Boulevard.

Gwinnett County is part of the Atlanta metropolitan area and has been rapidly growing over the past five years. The Cities of Buford and Sugar Hill, however, are located beyond the rapid growth area of the County. In 1960, the combined population of Buford and Sugar Hill was 5,300 persons. By 1970, the population had increased to 6,300 and by 1977, to 7,700. The 1970-1977 growth was a 20 percent increase over the 1970 population.

Although there are at least four major manufacturing plants in the Buford-Sugar Hill area, including a sizeable automobile assembling plant, much of the new population growth is created by persons who work in the Atlanta urban area but want to live in a small town environment. Future growth of the area is expected to follow this pattern.

Richland and Suwannee Creeks cut through small areas of the two cities. The Creeks are small, with narrow floodplains extending approximately 100 feet on either side of the Creeks. As shown on the attached map, Richland Creek intersects the City of Buford in the southwestern corner and Suwannee Creek intersects the City of Buford at the southeastern corner. There is presently little construction in the floodplain due to the terrain and the availability of other lands for development.

A wastewater treatment plant and interceptor serve all areas in the corporate limits of the two cities, including a substantial area (approximately 1,800 acres) of undeveloped land in the City of Buford. Therefore, the combined Cities of Buford and Sugar Hill were selected as the study area for this case example.

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*Based on interviews with Mr. Lewis Brinkley, Director, Gwinnett County Planning Department; Mr. Hubert Higgins, City of Buford Commissioner; Mr. David Van Landingham, Director, Gwinnett County Water Pollution Control Department; Mr. Bobby Curlin, Buford City Manager; and Mr. Paul O'Shield, Gwinnett County Department of Engineering.

In chronological order, the following federal programs have taken place in the Buford and Sugar Hill areas:

1963 - Water and Sewer Grant Program, U.S. Department of Housing and Urban Development - construction of sewer and water collector lines throughout Buford and Sugar Hill.

1975 - Federal-Aid Highway Program, U.S. Department of Transportation - Major improvements to U.S. Highway 20 leading to the Atlanta area.

1976 - Federal-Aid Highway Program, U.S. Department of Transportation - repaving and widening of Peachtree Industrial Boulevard, leading to the Atlanta area.

1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of the wastewater treatment plant and interceptor serving Buford and Sugar Hill.

1977 - Vocational Education Program, U.S. Department of Health, Education and Welfare - construction of a vocational school.

In progress - National Flood Insurance Program, U.S. Department of Housing and Urban Development - flood hazard study.

In progress - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - Step 1 facility planning for a regional wastewater treatment project.

In progress - Community Mental Health Center Program, U.S. Department of Health, Education and Welfare - major renovation of a mental health center (a small amount of revenue sharing funds received by Gwinnett County were also used for the project).

In addition, it is expected that a low-income housing project will be funded by the U.S. Department of Housing and Urban Development next year.

According to City and County officials interviewed, projects funded through the Federal-Aid Highway Program of the U.S. Department of Transportation and the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency are expected to have a major effect on urban growth and development in the area in the near future. Both programs are expected to allow and in some cases encourage urban development in the Cities of Buford and Sugar Hill.

Peachtree Industrial Boulevard connects the Cities of Buford and Sugar Hill with more industrially developed areas of the Atlanta metropolitan area, including Interstate 285 which is a major bypass around the City of Atlanta. The widening, repaving, and other highway improvements have been funded through the Federal-Aid Highway Program of the U.S. Department of Transportation. Construction is underway and the project is scheduled for completion in the next three years.

The City of Buford's wastewater treatment plant, recently built with a construction grant from the U.S. Environmental Protection Agency, is a second federally-funded project influencing growth and development of the area. The treatment works project includes a treatment plant, interceptors, and related facilities. The facility has a treatment capacity which could accommodate more than twice the load of wastewater from existing development in Buford and Sugar Hill.

High-strength industrial wastes are not permitted to enter the treatment facility, in accordance with the City of Buford's sewer use ordinance. Wastes from light industries and commercial establishments, however, can be treated by the facility. The presence of the treatment plant with capacity to serve new businesses is an important factor influencing businesses to locate in the area.

The treatment facility serves developed residential areas in Buford and Sugar Hill which have previously received sewer service through an older sewer system.

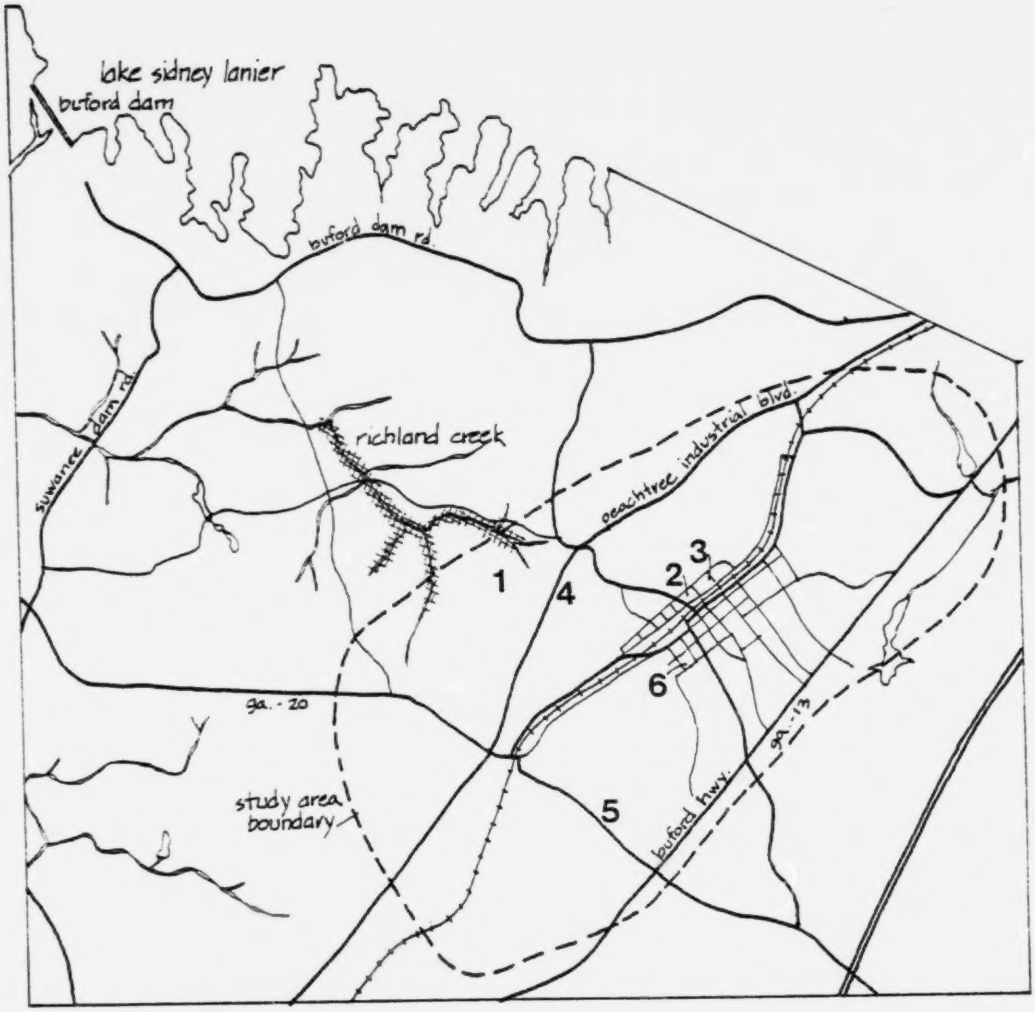
In developed locations, the new treatment facilities have not had an effect on development. In undeveloped areas, however, the presence of the new treatment facilities is allowing some development to occur. For example, in one development proposal, lenders provided funding only because wastewater treatment services were available.

In some locations the treatment facilities have also permitted a higher density of development than would have otherwise been possible. In other locations, sewer facilities are necessary for development, since septic tanks cannot be used on certain soils and slopes.

Major improvements on Peachtree Industrial Boulevard are underway and are scheduled for completion in the next two to three years. When completed, the highway improvements will link Buford and Sugar Hill to Interstate 285 which is the major perimeter highway in Atlanta. The Highway will make it easier for persons living in the Atlanta area to commute between the Buford-Sugar Hill area and Atlanta and will stimulate development. Several officials interviewed believe the Highway to be a more significant stimulus to growth than the treatment facility itself.

Development in the floodplain is not expected in the future due to the natural terrain. Future development in areas outside of the floodplain is expected, however, as a result of the continued growth of the Atlanta metropolitan area, the road access to jobs and other attractions in Atlanta, and the availability of wastewater treatment facilities.

Buford and Sugar Hill, Georgia



Key:

1 - Wastewater treatment plant and interceptor (EPA)
2 - Vocational school (HEW)
3 - Mental health center (HEW)
4 - Peachtree Industrial highway improvements (DOT)
5 - U.S. Highway 20 improvements (DOT)
6 - Water and sewer lines (scattered) (HUD)

▨ - FLOODPLAIN

CASE STUDY OF FLOODPLAIN DEVELOPMENT IN THE CITY OF TYBEE ISLAND, GEORGIA*

The City of Tybee Island (formerly the City of Savannah Beach) is a developed, barrier island eighteen miles east of the City of Savannah, Georgia. The Island is linked to the mainland by a long causeway.

Tybee Island is a small residential resort area known for its long ocean beach which stretches along the eastern shore of the Island. An estimated 20-30 percent of the residents are elderly retired families. A large number of the other households on the Island work in the City of Savannah. A number of summer homes are also located on the Island.

The permanent population of the Island was approximately 1,400 persons in 1960. In 1970, the population increased to 1,800, and by 1977, the Island had an estimated year-round population of 2,200. An additional 8,000-10,000 persons live on the Island during the summer months.

The Island is primarily developed with single-family homes. A string of motels line the eastern shore of the Island. The City has a small community commercial area. Significant single-family residential growth has occurred in the past five years. Since 1973, residential development and improvements to existing structures have occurred at an increasing rate. It is estimated that the tax digest of the City increased 43 percent in the past year alone. In the near future, significant townhouse and condominium development is anticipated. This development is generally taking place on vacant land. The major part of the Island is serviced by a wastewater treatment plant constructed in 1973 to replace an existing wastewater treatment system. The service area of the plant was not significantly changed by the completion of the new treatment facility.

The 100-year floodplain of the City includes virtually all land areas within the corporate limits. The floodplain includes the beach and sand dune area, the developed main portion of the Island, and the backshore of the Island and marshlands. The 100-year floodplain which is similar to the corporate limits of the City was selected as the study area.

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*Case study based on interview with Mr. Dan Johnson, City Administrator, City of Tybee Island, Georgia, March 3, 1978.

The following federal planning and construction programs have taken place in the City:

1973 and 1974 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of a wastewater treatment plant, sewer lines, and pump stations to replace an older wastewater treatment system.

1974 - Beach Erosion Control Project, U.S. Army Corps of Engineers - restoration and nourishment of 2.5 miles of shoreline beginning at the northern end of Tybee Island and extending south to vicinity of 18th Street, including construction of a terminal groin.

1977 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - flood control ordinance was adopted by the City.

Funding from the Land and Water Conservation Fund Program of the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) for improvements to a park at the northern end of the Island is expected this year.

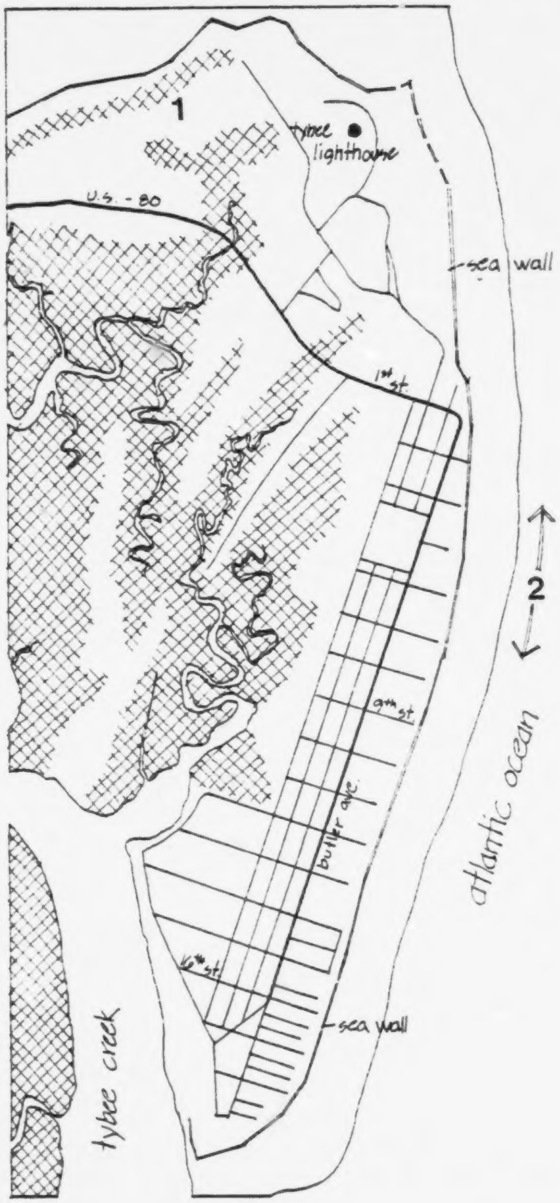
According to the City Administrator, federal programs have not been the stimulus for the growth and development of the Island. The forces encouraging development include factors such as the increasing demand for land in the Savannah area, the attractiveness of Tybee Island as a residential community, and amenities such as the ocean beach.

Although the beach erosion control project funded by the U.S. Army Corps of Engineers (in cooperation with the State of Georgia and the City of Tybee Island) has made the beach a more attractive recreation area, it has probably not been a major factor contributing to the residential development of the Island.

The construction of the wastewater treatment facility with funds from the U.S. Environmental Protection Agency has not affected growth and development since it is, in effect, a replacement system and does not provide additional sewerage service to the Island.

In summary, the growth and development pressures in the floodplain are similar to forces influencing development of the entire Island. Federal programs have provided important community facilities and amenities but have not been a direct stimulus to growth and development.

Tybee Island,
Georgia



Key:

1 - Wastewater treatment plant (EPA)
2 - Beach erosion control project (Army Corps of Engineers)

▨ - wetlands (the majority of the island is in the floodplain)

CASE STUDY OF FLOODPLAIN DEVELOPMENT IN THE CITY OF YORK, NEBRASKA*

The City of York, located 80 miles west of Lincoln, Nebraska, is a major commercial and agricultural supply center for the surrounding area. The City's present population is 8,000, reflecting a 15 percent growth from 1960 when the population totaled 6,778 persons. The 1960 population was 6,178. As reflected by the population totals, the City is growing at a steady rate.

York is a major commercial and service center for the surrounding agricultural areas. In addition, the City is the home for several small industries including a trailer manufacturing plant, an irrigation pipe company, an alfalfa mill and grain company and an electronics assembly operation. York is also the State operating headquarters for the Nebraska public power company. Warehousing activities related to this operation have resulted in the construction of a $6.5 million plant and the creation of 150 jobs since 1953.

The only major floodplain in the City of York spans an area of several hundred feet on either side of Beaver Creek which flows along the southern boundary of the City. Because the floodplain is largely undeveloped, the entire City was selected as the study area for the case example. The entire City of York is served by a wastewater treatment facility constructed through the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency.

The following federal planning and construction programs have occurred in York:

1961 - Sewage treatment plant construction grant from the Federal Public Health Agency.

1965 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - land use planning for the City of York, including the preparation of a plan identifying Beaver Creek and the floodplain as a city park and natural area.

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*Case study based on interview with Mr. Jack R. Kidder, City Administrator, City of York, Nebraska, March 28, 1978.

1954 - Federal-Aid Highway Program, U.S. Department of Transportation - road widening, relocation, and resurfacing projects at several locations in the City.

1967 - Library Services and Construction Act, Title II, U.S. Department of Health, Education and Welfare - reconstruction of the City Library.

1970 - Public Housing Program, U.S. Department of Housing and Urban Development - construction of 82 low-income housing projects for the elderly.

1972 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - update of the comprehensive land use plan.

1973 - Hill-Burton Construction Program, U.S. Department of Health, Education and Welfare - construction of a new hospital.

1972 to 1973 - Revenue Sharing Program, U.S. Department of the Treasury - funds used for City construction projects including utilities and other capital improvements.

1975 - Section 8 Housing Program, U.S. Department of Housing and Urban Development - construction of a 64 unit project for the elderly.

1977 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - The City of York adopted regulations for construction in flood hazard areas, in compliance with the federal program.

1978 - Public Housing Program, U.S. Department of Housing and Urban Development - approval received for the construction of 32 units of housing for the elderly.

1978 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - completion of construction on a wastewater treatment plant and interceptor serving the City of York.

1970's-Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - acquisition and development of major areas of the floodplain for park and nature areas (Beaver Creek Park).

Two of the federal programs, the Land and Water Conservation Fund Program and the '201' Wastewater Treatment Works Program, have had a major effect on growth and development in the City of York. The '701' Comprehensive Planning Assistance Program has also been of importance, since plans completed with '701' funds have provided the framework for a number of public and private improvements which have added to the attractiveness of the City.

The Land and Water Conservation Fund Program is directly related to the use of the floodplain along Beaver Creek for public purposes. The Program made it possible to implement a plan for the public use of the site.

The flooding problems along Beaver Creek have long been recognized and as a result, little urban development has occurred in the floodplain. During the early 1970's when concern about floodplains and flood hazards was growing across the nation, the City of York also realized the need for a new wastewater treatment facility to replace the existing plant. The floodplain was a logical site for the facility, although fill was necessary to increase the elevation to meet the standards of the National Flood Insurance Program. The City found, however, that fill material was extremely expensive at the site recommended.

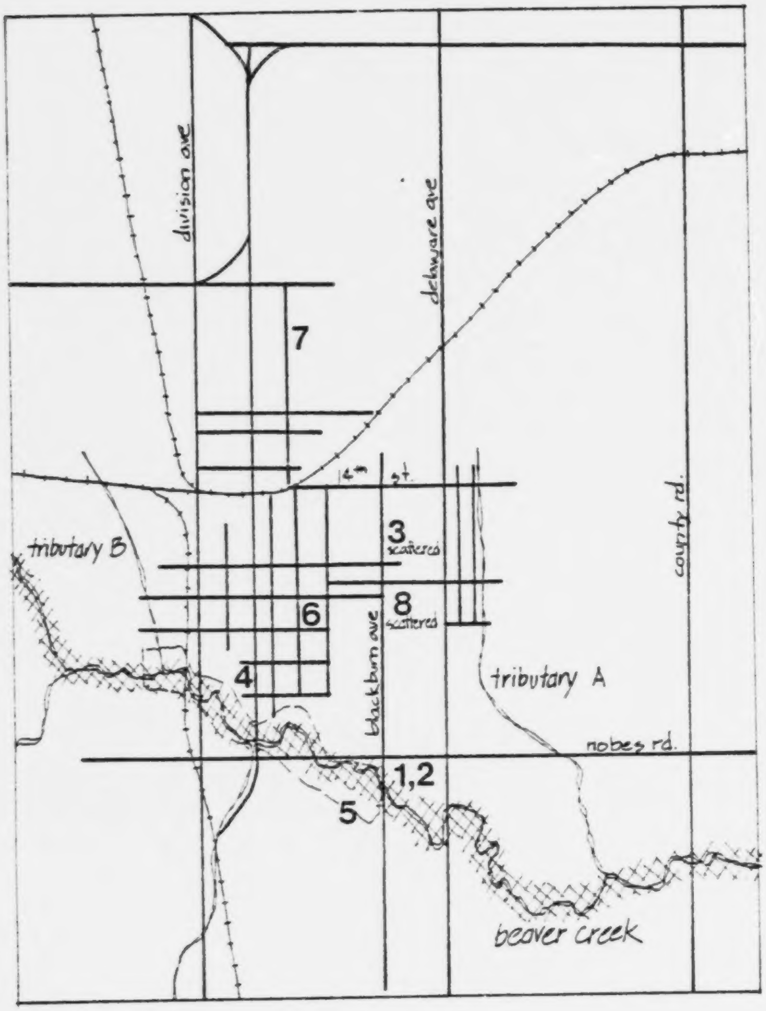
By combining these problems and needs with the recreational potential of the Beaver Creek floodplain and the Land and Water Conservation Fund Program, a major scheme for the acquisition and public use of the floodplain was developed. As stated in the land use plan developed through the '701'

Comprehensive Planning Assistance Program and later detailed in a site plan for Beaver Creek, the concept was to use the broad floodplain fringe as a City park, with bike paths, picnic areas, nature trails, and playing fields. Fill from the low-lying floodplain park would be used to elevate the floodplain site for the wastewater treatment facility. Other public purposes, such as the provision of land for a maintenance building for the City, could also be achieved. Through acquisition, all further danger of urban development in the floodplain was avoided, and the City was able to turn a liability into a City attraction.

Although the new treatment plant and interceptor are additions to the existing facility, the new facility is considered to be a factor attracting growth and development to York. The facility is an attraction for water-using industries which require modern treatment facilities as well as an attraction for residential developers who may be afraid of costly development delays due to lack of adequate sewer service. Although the facility provides service to several homes and businesses located in the flood fringe on the edge of the floodplain, the facility will not encourage growth in the floodplain. Floodplain fringe development is discouraged, although not prohibited by the City's floodplain ordinance.

In summary, the City of York has promoted the use of the floodplain for recreational and other public purposes. The Land and Water Conservation Fund Program provided essential federal funding support which led to the acquisition and development of Beaver Creek Park. As a result of the park acquisition program, urban development of the floodplain is not anticipated. Although the '201' wastewater treatment plant is a factor influencing the overall growth of the City of York, it is not a stimulus to development in the floodplain.

York ,
Nebraska



Key:

1 - Wastewater treatment plant (EPA)
2 - New wastewater treatment plant (EPA)
3 - Road improvement projects (scattered) (DOT)
4 - Elderly public housing (HUD)
5 - Beaver Creek Park (HCRS)
6 - Library reconstruction (HEW)
7 - Hospital construction (HEW)
8 - Low-income housing (HUD)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN MANHATTAN, KANSAS*

Manhattan, Kansas is a university community situated 101 miles west of Kansas City and 56 miles west of Topeka, Kansas, the state capitol.

Federal Census figures indicate that in 1950, Manhattan had a population of 19,056. The community experienced moderate growth in the next decade, having a 1960 population of 22,797. The figure for 1970 was 27,575.

These Census figures do not reflect the large enrollment in Kansas State University. The University campus in in northern Manhattan and occupies 315 acres of land. The University student body totaled 17,901 in 1976. Including these students, Manhattan's present population is close to 50,000.

Manhattan's overall economy is largely related to the University and Fort Riley, a U.S. Military installation located 15 miles west of the City. In addition to a full-time student enrollment of almost 18,000, Kansas State University employs 1,982 facility members and 1,877 support staff. Fort Riley employs 16,384 military personnel and over 5,000 civilians. Thirty one percent of the military personnel who reside outside the Fort live in the City of Manhattan.

The major private sector employer is the McCall Pattern Company with 600 employees, followed by Farm Bureau, Inc. with approximately 350 employees.

Floodplains in Manhattan are associated with the Kansas River which skirts the City's southeastern boundary, and Wildcat Creek which flows in a south-southeasterly direction in the western portion of the City.

Floodplain areas in Manhattan associated with the Kansas River are small and situated in the southeastern corner of the City. Prior to 1963, much of the City was included in the floodplain of the Kansas River. In 1963, the U.S. Army Corps of Engineers completed a rolled earth levee between Wildcat Creek and the confluence of the Kansas and Big Blue Rivers. The construction of the levee removed much of the developed area from the floodplain by changing the floodplain boundaries. The part of the City located between the levee and the Kansas River remains as the floodplain and is still undeveloped.

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*Information for this case study was provided by Mr. Bruce McCallum, City Engineer, and Mr. Jerry Petty, Design Engineer, City of Manhattan, Kansas, March 9, 1978. Supplementary information on the levee was obtained in a telephone interview with Mr. Robert Browning, Civil Engineer, U.S. Army Corps of Engineers Regional Office, Kansas City, Missouri.

The floodplain associated with Wildcat Creek is located entirely in the western part of Manhattan. At the point where the Creek enters the City, the width of the floodplain is approximately 1,800 feet. At its narrowest point, the floodplain is about 250 feet wide. The varying width of the floodplain reflects the varying steepness of the slopes bordering each side of the Creek.

Since the early 1960's, development within Manhattan has occurred in the western part of the City, in and around the Wildcat Creek floodplain. This development includes a mixture of residential, commercial, and public-owned uses. Other parts of the floodplain remain undeveloped, being largely devoted to agricultural and park uses.

The '201' wastewater treatment facilities grants to Manhattan are for construction of a replacement waste treatment facility, two major interceptors, force mains, pump stations and for purchase of a 120 acre farm to serve as a sludge disposal site. Mr. Bruce McCallum, the City Engineer, stated that EPA requirements for secondary treatment, coupled with the capacity limitations of the old facility, were responsible for the new construction. The treatment facility serves the entire City.

The service area of the wastewater treatment facility has been selected as the case study area for detailed examination.

Major federal construction and planning funds received by the City of Manhattan are listed below in chronological order.

1960 - to 1963	Flood Control Project, U.S. Army Corps of Engineers - construction of a flood protection unit (levee) on the north side of the Kansas River.

1975 - Federal-Aid Highway Program, U.S. Department of Transportation - installation of traffic signals and road improvements on Highway 24.

1975 to 1977 - U.S. Department of Housing and Urban Development - $992,000 per annum assistance grant for removal of dilapidated housing structures, housing rehabilitation, low-income housing construction and improvements to sidewalks and streets.

1978 to 1979 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - grants totalling $900,000 for housing projects.

1976 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - Step 3 facilities grant for construction of a wastewater treatment plant and two interceptors, and purchase of equipment and a sludge disposal site.

1978 - Sewer and Water Facilities Program, Farmers Home Administration, U.S. Department of Agriculture - street improvement projects.

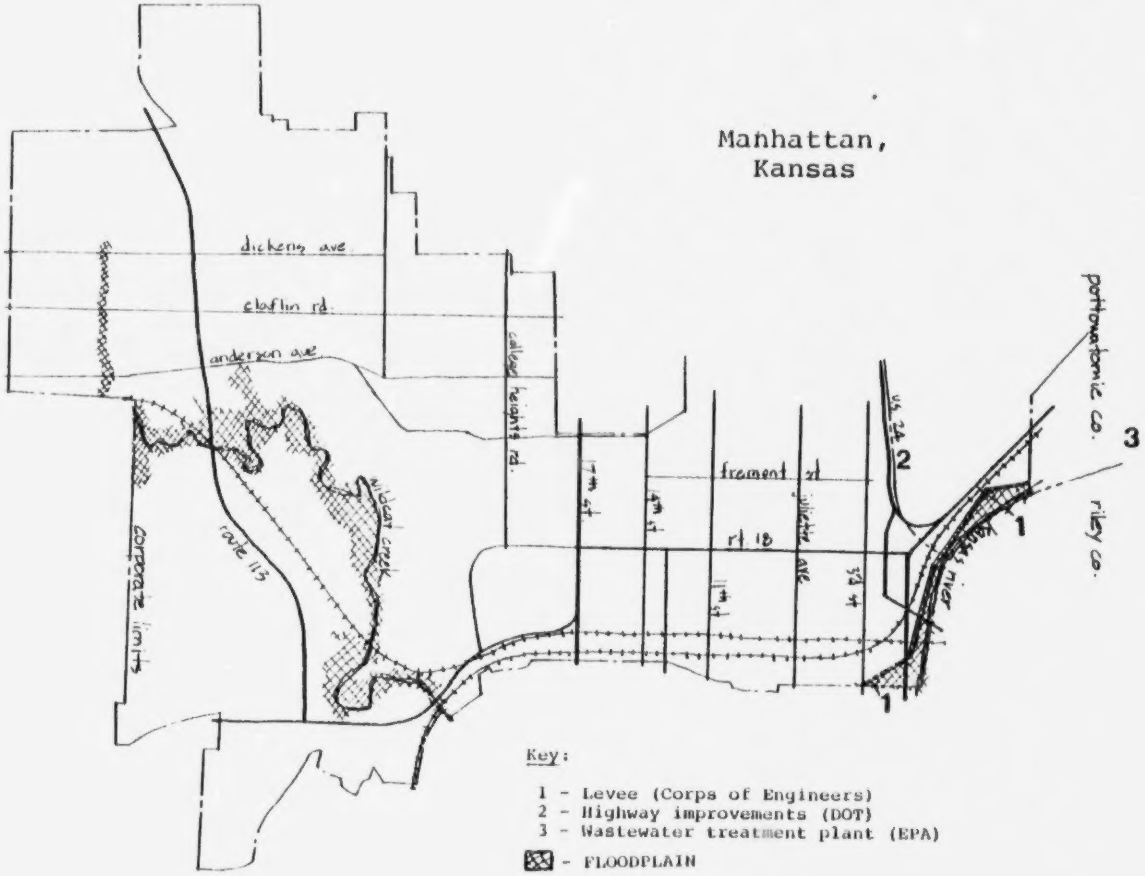
Kansas State University has also been the recipient of many grants from the federal government for both educational programs and facility construction.

City officials believe that federal dollars spent on Fort Riley and Kansas State University have had secondary growth impacts on the City of Manhattan. However, they do not feel that federal grant programs applied in the City itself have stimulated growth. Since the old wastewater treatment facility is nearing capacity, the new facility will allow growth to occur. This growth is not expected to take place in floodplain areas. Mr. McCallum feels that the existence of developable land outside of the floodplain will direct growth away from flood prone areas.

The levee built by the U.S. Army Corps of Engineers has eliminated the threat of flooding in parts of downtown Manhattan. Without the levee, commercial and residential development near the Kansas River would not be feasible.

In summary, federal programs related to Kansas State University and Fort Riley have had growth impacts on the City of Manhattan. Federal grant assistance to the City has improved the quality of community life but has not been a stimulus to growth. The levee along the Kansas River constructed by the U.S. Army Corps of Engineers has allowed waterfront development, and the wastewater treatment facilities grant from EPA will provide a important infrastructure facilities necessary for growth. Federal programs, to date, have not, however, influenced the development of flood prone areas.

Manhattan, Kansas



Key:

1 - Levee (Corps of Engineers)
2 - Highway improvements (DOT)
3 - Wastewater treatment plant (EPA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN DESOTO, KANSAS*

DeSoto is a small City in Kansas located approximately 17 miles southwest of the Kansas City, Missouri business district.

The City of DeSoto is in the process of changing from a rural agricultural community to a suburban community in the Kansas City metropolitan area. The transition, however, has not been rapid and the City's population has actually declined since 1970. Prior to the recent decline, DeSoto had experienced steady growth since 1940. The 1950 federal Census placed the City's population at 518. In the ensuing decade, the population more than doubled, rising to 1,271 in 1960. A more modest increase took place during the 1960's, as indicated by the 1970 federal Census which established DeSoto's population to be 1,839.

DeSoto's periods of active growth occurred primarily as a result of production activity at the Sunflower Army Ammunition Plant which is situated southwest of the City near the corporate limits. The plant was very active during World War II and attracted many workers during the Korean and Vietnam Wars. Intermittant stoppages in plant production have resulted in declines in the number of annual housing starts within the City. From 1965 to 1971 the plant was in operation as a result of the Vietnam War and the City experienced population growth. The plant was idled in 1971 and has not been an active producer of ammunition since that time. In 1972, the City of DeSoto authorized eleven permits for the construction of private housing units. The number of permits issued in 1975 was nineteen, the number for 1976 was only five.

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*Information for this case study was provided by Mr. Thomas Neal, '208' Project Coordinator, and Ms. Marlene Nagle, Planner, Mid-America Regional Council, Kansas City, Missouri, March 8, 1978. Supplementary information on federal grant assistance to DeSoto was provided by JoAnn Dinger, DeSoto City Clerk, in a telephone interview. Information regarding production activities at the Sunflower Army Ammunitions Plant was received through a telephone interview with W. G. Moorhead, Commander's Representative, Sunflower Army Ammunition Plant, DeSoto, Kansas.

There are no other significant industries located in DeSoto.

The Kansas River forms part of the City's northern boundary. The floodplain of the Kansas River in DeSoto includes only a narrow strip of land near the edge of the River. At one time the floodplain of the Kansas River was much larger and included most of the City, but a levee constructed by the U.S. Army Corps of Engineers subsequent to the 1951 flood has greatly reduced the land subject to future flooding.

Flood hazard areas within DeSoto are also associated with Kill Creek, which flows in a northeasterly direction on a course which roughly conforms to the City's eastern boundaries. The Creek empties into the Kansas River in the extreme northeast corner of the City. The Kill Creek floodplain is generally narrow, with steep slopes along the banks of the Creek. The slopes are covered with trees and dense brush. Areas adjacent to the floodplain are mostly flat. Flood frequencies on Kill Creek have been determined to be higher than on the Kansas River.

Flood hazard areas associated with both the Kansas River and Kill Creek remain, for the most part, undeveloped. A recent survey indicated that six dwelling units were located in flood hazard areas.

The City of DeSoto was awarded a '201' wastewater facilities grant in 1976 for construction of an oxidation ditch-type waste treatment plant, lift station, force main and interceptor. The system replaces an imhoff tank constructed in the late 1950's. The new facility provides secondary treatment, and increases waste load capacity from 150,000 to 400,000 gallons per day.

Because there is little development in floodplain areas, the service area of the wastewater treatment facility was selected as the study area.

The following federal programs, listed in chronological order, have occurred in DeSoto:

1950's-Flood Control Projects, U.S. Army Corps of Engineers - construction of levee along the south bank of the Kansas River.

1972 - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - development of a city park.

1975 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - flood control ordinance adopted by the City of DeSoto.

1976 - Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - $243,243 grant for construction of wastewater treatment works.

1976 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - $457,500 grant for construction of wastewater treatment works.

1977 - Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - general street improvements.

1977 - Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - improvements to the City Hall/Fire Station.

1977 - Federal-Aid Highway Program, U.S. Department of Transportation - relocation and expansion of State Highway 10 (relocation site is south of DeSoto).

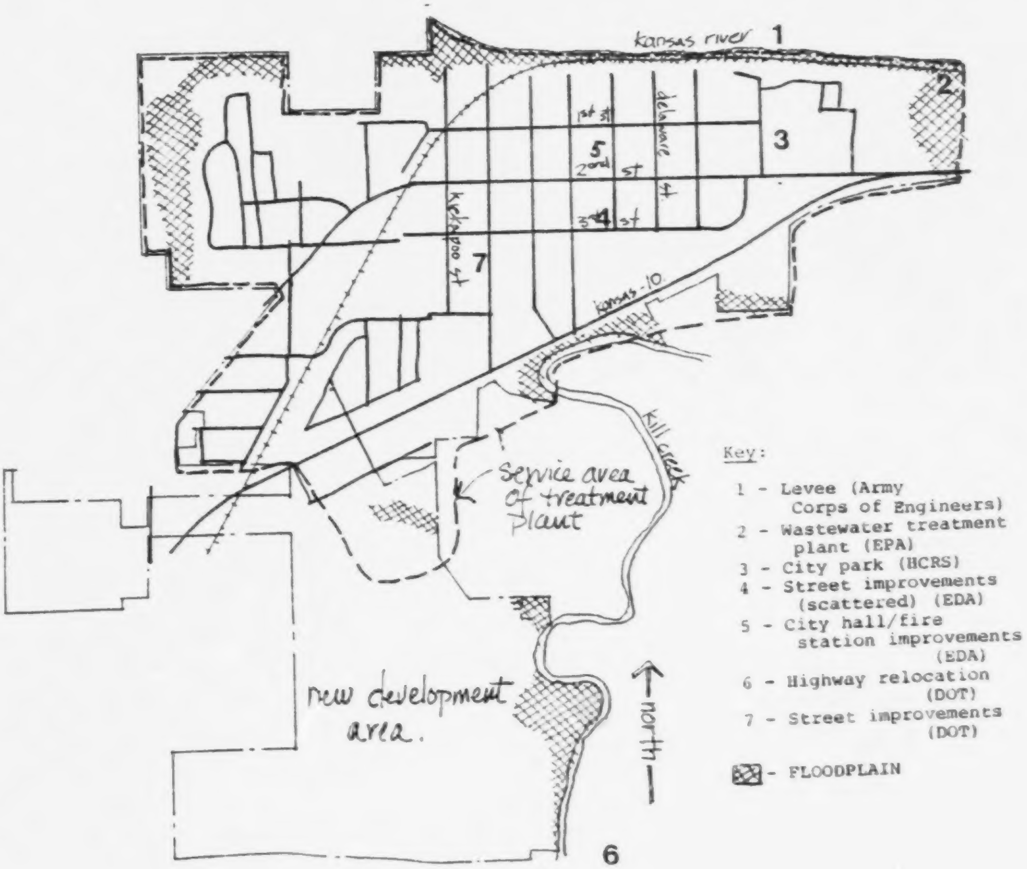
1978 - Federal-Aid Highway Program, U.S. Department of Transportation - installation of curbs and gutters on Ottawa Street.

Although not affiliated with any government program, the Sunflower Army Ammunition Plant is owned and operated by the U.S. Army. According to regional planners, production activity associated with the Sunflower Plant has been largely responsible for the fluctuations in the rate of growth and development in DeSoto which have occurred since the 1940's.

With the ammunition plant idle since 1971, the City has experienced a gradual population decline. The regional planners believe that this trend may be partially offset when the full effects of the relocation of Highway 10 are felt. Completed in 1977, this four-lane highway provides improved access to DeSoto from both the Lawrence and Kansas City metropolitan areas. DeSoto City Clerk, JoAnn Dinger, believes that planned residential development in the southeastern part of the City is primarily attributable to the improved access provided by the new highway. The '201' wastewater facility grant was similarly significant in that it allows additional residential growth to occur.

In summary, federal programs are expected to have some effect on growth and development in DeSoto, although the effects presently remain unrealized. Reopening the Sunflower Army Ammunition Plant would definitely have a growth impact since plant workers would return to the area. Little development in floodplain areas has taken place as a result of flooding hazards and a 1975 Flood Control Ordinance, and no future development in the floodplain is anticipated.

DeSoto,
Kansas



Key:

1 - Levee (Army Corps of Engineers)
2 - Wastewater treatment plant (EPA)
3 - City park (HCRS)
4 - Street improvements (scattered) (EDA)
5 - City hall/fire station improvements (EDA)
6 - Highway relocation (DOT)
7 - Street improvements (DOT)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN WAMEGO, KANSAS*

Wamego, Kansas is a rural farm community located on the north bank of the Kansas River in the extreme south central part of Pottawatomie County. Topeka, Kansas, the State capitol, is situated thirty-seven miles east by way of U.S. 24.

U.S. Census figures indicate that Wamego had a 1950 population of 1,869. The population rose to 2,363 by 1960, an increase of 26.4 percent. County assessors records indicate that the 1950's growth rate was not repeated in the 1960's. In 1968, assessors records set Wamego's population at 2,401. An actual head count conducted in 1977 established the City's population to be 2,910.

Since the early 1970's, Wamego's population has been affected by some spillover from the City of Manhattan. Blue collar workers in particular, although their work is in Manhattan, are establishing residence in Wamego.

Future growth for Wamego is likely to depend on whether the Oscar Mayer Corporation, which owns 700 acres of land east of the City limits, elects to construct a major food processing plant on the site. Company officials had expressed such a desire four years ago, but a rise in fuel costs and hog prices forced reconsideration. If the Company does develop the site in the near future, Wamego is likely to be the residence for the majority of the projected 200 employees and their families.

A second, less speculative, factor which will have growth impacts on Wamego is construction by the Kansas Power and Light Company of a major coal-fired power plant nine miles to the northeast of downtown Wamego. The City is expected to develop as a secondary service center for employees at the plant, Manhattan being the primary center due to its size and range of services available.

Residential growth in Wamego has recently occurred in the western portions of the City and in areas adjoining the western City boundary. This growth has resulted in annexation activity, and William Owens, the City Manager, believes that another annexation in the southeast corner of the City is foreseeable. Residential growth on a more modified scale is taking place to the north across Highway 24. Annexations of subdivisions north of Highway 24 are not anticipated before 1980.

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*Information for the case study was provided in an interview with Mr. William B. Owens, City Manager, City of Wamego, Kansas, March 9, 1978. Supportive information on federal programs in Wamego was provided by Mr. Frank A. Mosier, Director, Big Lakes Regional Planning Commission.

Industry is primarily located on the east side. Manufacturing in Wamego includes fabricated steel products, dairy products and livestock feed. The major industrial operation, Balderson, Inc., makes blades, plows and attachments for tractors which are sold throughout the United States and in other countries. Industrial development, such as the previously-mentioned Oscar Mayer project will continue to be situated east of the City.

The greatest flood on record on the Kansas River occurred in July, 1951. There was widespread flooding of agricultural land in the valley on the south side of the River, but none in Wamego itself. Flooding does not occur in Wamego because the the city is located on a shelf 30 to 50 feet above the average height of the River. A narrow belt of floodplain has been identified along the Wamego side of the River. This floodplain is undeveloped, except for a greenhouse which was built in the early 1900's and survived the flood.

Other identified floodplain areas are associated with a drainage course which flows around the north and east side of the City carrying runoff from nearly 2,000 acres of land to the River. Most of the stream's watershed is in the rolling hills north of the City.

Some of the low land immediately north of U.S. Highway 24 is subject to periodic inundation by this stream. Below the highway, the stream is carried through the north and east periphery of the City in a deep ditch. The side slopes of the ditch are steep and covered with dense growth of small trees and brush. Parts of the floodplain associated with the stream are developed. Since the mid-1960's, a commercial area has developed on the south side of Highway 24. The ditch is located approximately 25 feet to the north of the highway and parallels the roadway for about 3,000 feet.

In the northeast corner of the City there are some residences along Pine and Eighth Streets which are in the identified floodplain. Included is a mobile home park. According to Mr. Owens, overflows in these areas are infrequent, of short duration and have caused little damage to property.

Wamego's expanded wastewater treatment facility is in operation. The expanded plant doubled the capacity of the previous facility which was capable of treating wastes generated by a population of 2,500. The move to initiate treatment plant expansion was, however, primarily in response to meeting EPA requirements for the provision of secondary treatment. An EPA '201' grant in the amount of $468,000 was awarded to the City in 1976 for construction of the plant expansion.

The expanded treatment plant is located east of the City approximately 50 feet above the Kansas River and out of the floodplain. The service area of the plant generally conforms to the City boundaries. A small unincorporated area east of the City is also included in the service area. The area served by the expanded wastewater treatment plant has been selected as the case study area for detailed examination.

Federal construction and planning funds received by the City of Wamego are listed below in chronological order.

1938 - Works Project Administration - construction of Wamego High School.

1951 - Relocation of U.S. Highway 24 from its former location (Fourth Street) to its present site.

1970 - Public Housing Program, U.S. Department of Housing and Urban Development - construction of low income housing for the elderly.

1970 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - preparation of Comprehensive City Plan.

1976 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of wastewater treatment works.

1976 - National Flood Insurance Program , Federal Insurance Administration,U.S. Department of Housing and Urban Development - participation in the Program.

Federal programs have not stimulated growth in Wamego. Anticipated growth is largely related to privately initiated projects, such as the Kansas Power and Light Power Plant now under construction and a processing plant which might eventually be built by the Oscar Mayer Company. The City Manager did state that the existence of a comprehensive plan delineating specific industrial sites is helpful in attracting new industry.

Federal highway programs have influenced the location of business development in Wamego. U.S. Highway 24 was originally constructed in 1928 and was located along the present site of Fourth Street. In 1951, the highway was relocated to the north. Commercial development has subsequently gravitated northward, closer to the floodplain of the drainage stream.

Increasing the capacity of the City's waste treatment facilities will allow the families of workers at any new industries to establish residence in Wamego. The expanded waste treatment plant will also allow newly annexed areas to be served by the City's sewerage systems. At present, unincorporated subdivisions to the north and west are served by individual septic systems. Septic tanks are not allowed within the City limits. Since development is occurring to the north and west, away from identified floodplains, expansion of the waste treatment plant is not expected to increase pressure for development of floodplain areas.

Some federal projects which are not directly related to Wamego have mitigated the danger of floods occurring within the City. Since the great flood of 1951, some of the largest reservoirs in the State have been constructed by the Corps of Engineers to reduce flooding along the Kansas, Republican and Big Blue Rivers. Low areas, such as the airport site east of Wamego are still vulnerable to some degree. The probability of flooding in Wamego by waters of the Kansas River is extremely remote due to the location of the City on a land shelf above the River and due to these upstream dams constructed by the Corps.

The Agricultural Stabilization and Conservation Service has on a continuing basis provided money to farmers for the construction of ponds, terraces and waterways to control agricultural runoff. ASCS programs are significant because they control the amount of runoff which eventually empties into the Kansas River via drainage streams, including the drainage stream in Wamego. Thus, the cumulative impacts of ASCS activity have probably reduced the flood hazard potential in Wamego from overflow of the drainage stream. Documentation of the full extent of the impact is, however, not available.[1]

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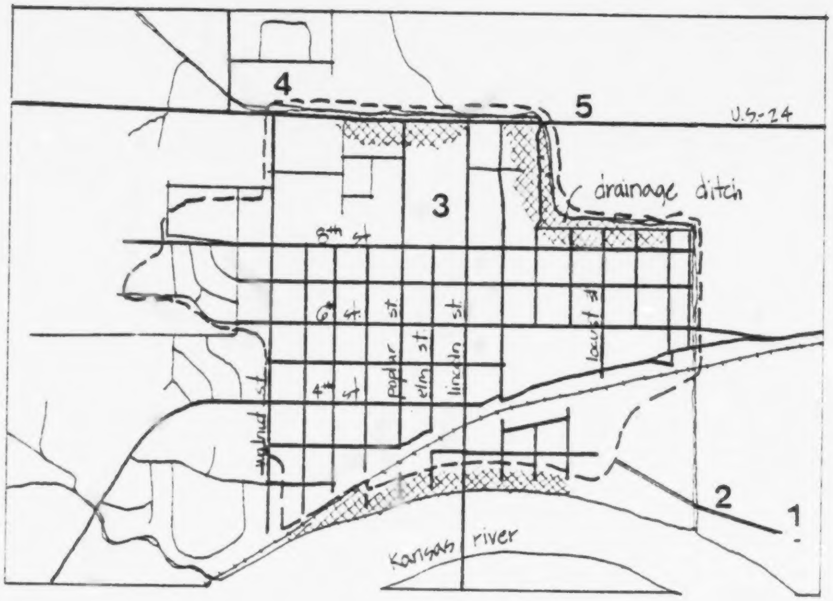
[1] Telephone interview with Mr. Dale Detweiler, Agricultural Stabilization and Conservation Service, Westmoreland, Kansas.

Together, the construction of upstream reservoirs by the Corps and the runoff control projects of ASCS have reduced the danger of floods occurring in Wamego. However, the City Manager does not believe that the modest reduction in flood potential resulting from these programs has had any impact on development within the City's floodplain areas.

In summary, federal programs have not stimulated growth and development in Wamego, but the expansion of the City's waste treatment facilities will allow additional growth both through internal development and annexation. Federal highway programs, while not growth stimulants, have influenced business location trends within the City. Identified floodplain areas along the continually flowing drainage stream are already partially developed. Further development of these areas is unlikely since growth pressures are generally being realized in the western part of the City.

Federal programs have provided important community facilities, but have not been a direct stimulus to growth and development in and around the City of Wamego.

Wamego,
Kansas



Key:

1 - Wastewater treatment plant (EPA)
2 - Parallel interceptors (EPA)
3 - High school (Works Project Adm.)
4 - Low-income housing (HUD)
5 - U.S. Highway 24 (DOT)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN PLEASANT HILL, MISSOURI*

Pleasant Hill is a small Missouri City situated 25 miles from Kansas City, Missouri. The City first began to thrive when the Missouri Pacific Railroad was constructed in the mid 1860's. In 1900, Pleasant Hill had 2,002 residents; by 1950 there were 2,200. In between, the population ranged from a high of 2,330 to a low of 1,965. From 1950 to 1970 the City showed strong growth trends, increasing 22.2 percent from 1950 to 1960 and 26.3 percent from 1960 to 1970, when the population reached 3,396. Estimates place the 1973 population of Pleasant Hill at 3,688, indicating that the City continues to grow.

Located on Missouri Highways 58 and 7, Pleasant Hill has good highway access to the Kansas City metropolitan area. This factor, coupled with Pleasant Hill's attractive rural setting, has encouraged the City's development as a bedroom community to Kansas City. In 1970, there were 715 commuters who traveled outside Pleasant Hill to work. These commuters comprised 48 percent of the total resident labor force. The balance of the City's economic base is made up of activities associated with agriculture, construction, manufacturing and wholesaling.

The floodplain in Pleasant Hill is associated with Big Creek which winds through the southwest corner of the City. This tree-lined Creek flows through the City in a deep, narrow depression with steep side slopes. The slopes on both sides of the Creek are covered with low dense brush. The adjacent floodplain is predominantly open and slopes downward towards the railroad tracks and the Central Business District. A large portion of the Central Business District is located in the floodplain. The Creek floods frequently, forcing roads to be closed and impairing activity in parts of the downtown commercial area.

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*Information for this case study was provided in an interview with Mr. Thomas Neal, '208' Project Coordinator, and Ms. Marlene Nagle, Planner, Mid-America Regional Council, Kansas City, Missouri, March 8, 1978. Supplementary information on floodplain characteristics and federal grant assistance was obtained in telephone interviews with Mr. James Bell, City Clerk, and Ms. Sandy Beatty, Secretary to the Board of Public Works, Pleasant Hill, Missouri.

The City of Pleasant Hill has received a Step 2 wastewater treatment facilities grant from the U.S. Environmental Protection Agency to improve and expand the existing system. The present facilities are of the lagoon type and will soon be inadequate. The plant is located south of the City, in the floodplain of Big Creek.

The Sunnyside subdivision in the northeast part of the City is presently served by a separate small lagoon. This small lagoon system will be phased out when the new treatment plant and interceptors are completed. The new interceptor will open up the northern part of the City to further development.

Because new development is not occurring near the floodplain, the entire City was selected as the study area.

The following federal programs, listed in chronological order, have occurred in Pleasant Hill:

1865 Completion of the Missouri Pacific Railroad.

1975 National Flood Insurance Program, U.S. Department of Housing and Urban Development - a flood control ordinance was adopted by the City of Pleasant Hill.

1976 '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - Step 1 facilities planning grant for wastewater treatment plant expansion.

1977 Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - grant for construction of a community swimming pool.

1977 Federal Disaster Assistance Administration, U.S. Department of Housing and Urban Development - $80,000 initial assistance for tornado clean-up and reconstruction.

1978 Federal Disaster Assistance Administration, U.S. Department of Housing and Urban Development - additional tornado clean-up and reconstruction funds ($60,000 - $70,000).

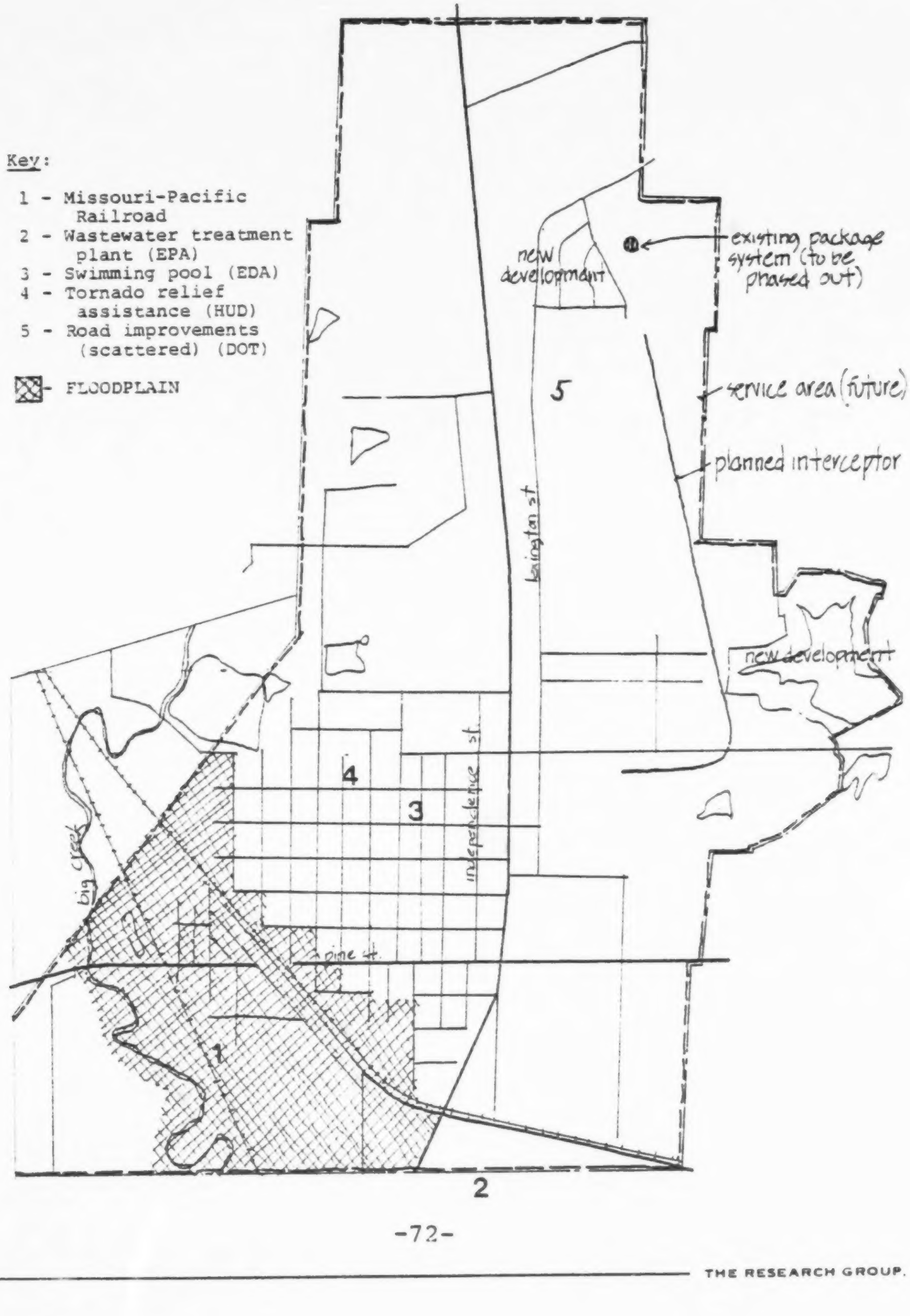
1978 Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - $125,000 street improvement grant.

Regional planners and the two local administrators who were interviewed agree that federal programs have not affected growth and development in Pleasant Hill. The City is expected to grow at a gradual but steady rate as part of the overall development and expansion of the Kansas City metropolitan area. Completion of the new wastewater treatment plant and northern interceptor will allow development to occur in sections of the City which are presently undeveloped. However, the treatment facility is not being viewed as a growth stimulant. As suburban Kansas City grows, the majority of the growth in the direction of Pleasant Hill is expected to take place in the communities of Blue Springs and Lee's Summit.

Residential growth that does occur in Pleasant Hill is unlikely to occupy flood-prone lands. The newer subdivisions are being developed in the northern and eastern sections of the City, away from the floodplain of Big Creek. Recent commercial development has similarly displayed trends of moving northward out of the floodplain. However, a large part of the City's downtown business area remains in the floodplain and is subject to periodic flooding.

In summary, federal programs have had an influence on the quality of community life and have provided much needed tornado disaster relief. Federal programs have not, however, been major forces encouraging growth and development to take place.

Pleasant Hill,
Missouri


Key:
1 - Missouri-Pacific Railroad
2 - Wastewater treatment plant (EPA)
3 - Swimming pool (EDA)
4 - Tornado relief assistance (HUD)
5 - Road improvements (scattered) (DOT)
▨ - FLOODPLAIN
new development
existing package system (to be phased out)
service area (future)
planned interceptor
5
lexington st
new development
4
3
independence st
big creek
pine st.
1
2

CASE STUDY OF DEVELOPMENT
CITY OF HARLAN, IOWA*

Harlan is a small city in Iowa located approximately 50 miles northeast of the Omaha, Nebraska-Council Bluffs, Iowa area. The City is the County Seat of Shelby County and a major agricultural service and trade center for the surrounding communities.

Although several new residential subdivisions have been constructed in the past ten years, census figures indicate very little population growth. In the 1960 to 1970 decade, population increased from approximately 4,300 to 5,000 persons. Current population is approximately 5,200 persons. A small amount of the population increase is due to persons from the Omaha-Council Bluffs area moving out to enjoy rural living.

Agricultural products and services provide the major economic base for the City. Since the closing of a meat packing plant, no single industry dominates the economy. The City Administration is encouraging the rehabilitation and reuse of the meat packing plant to provide 125 jobs in the community. If the efforts of the Chamber of Commerce are successful, moderate growth of the community is expected. Federal funds from the Economic Development Administration have been applied for, but funding remains uncertain.

The Nishnabotna River flows through the southeastern corner of the City. Although the bed of the River has eroded into the surrounding land, the adjacent floodplain rises gradually from the bank of the River. Serious floods endangering lives and property have occurred three times in the past twenty years.

Less than five percent of the floodplain is developed. Present development includes mobile homes which have been in the floodplain for the past twenty years and light industry. The majority of the floodplain is in agricultural use. The flooding problems have been a significant deterrent to development in the floodplain and have also served as a barrier to further development in the southeast area of Harlan.

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*Case study based on interviews with Mr. Eugene Brailey, Harlan City Administrator and Mr. Robert Donels, Executive Director, Southwest Iowa Regional Planning Council, March 28, 1978.

Because there is little development in the floodplain, the entire City was selected as the study area.

The following federal programs, listed in chronological order, have occurred in Harlan:

1972 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development -land use planning grant.

1975 - Section 8 Housing Program, U.S. Department of Housing and Urban Development - construction of 64 units of housing for the elderly.

1977 - Federal-Aid Highway Program, U.S. Department of Transportation - several small highway improvement projects.

1978 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - completion of wastewater treatment plant and interceptor construction.

1977-1978 National Flood Insurance Program, U.S. Department of Housing and Urban Development - all requirements of the regular program have been met and flood insurance is available.

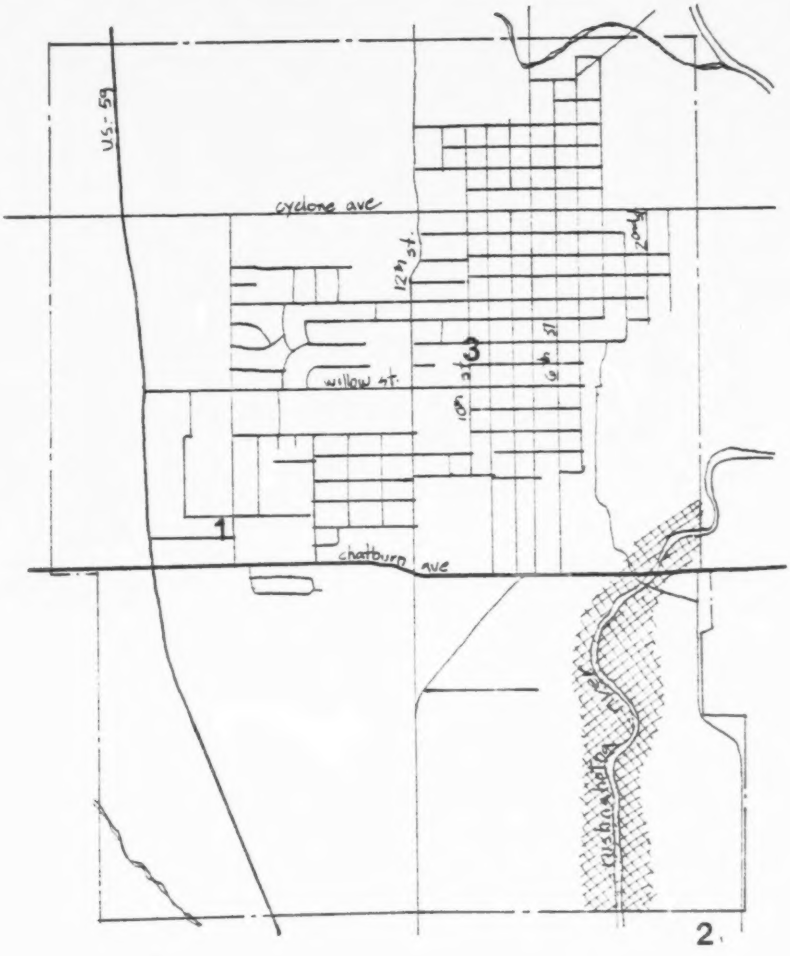
In addition to these programs, some persons have obtained mortgage loans from the Farmers Home Administration of the U.S. Department of Housing and Urban Development.

The Section 8 Housing Program involving the construction of 64 units of elderly housing is the only federal program which has affected growth in Harlan. The Program has allowed growth to take place outside of the floodplain. It is estimated that approximately half of the units are occupied by persons from outside the City. Secondary or spinoff development, however, has not been associated with the program.

The '201' wastewater treatment facility replaces and expands service from the existing municipal system. Wastewater treatment service is provided to some undeveloped areas within the City including areas in the floodplain. Although the federal construction grant has resulted in a necessary community improvement, as of now, it has neither stimulated nor allowed growth to occur which otherwise would not have been present.

In summary, federal programs, apart from the elderly housing project, have not affected growth and development in Harlan. Although federal financial assistance in the rehabilitation of the sausage plant has been investigated, funding prospects are uncertain. If federal funds were obtained, a direct effect on growth would be observed. Little development in the floodplain has taken place as a result of flooding hazards and little future development is anticipated.

Harlan,
Iowa



Key:

1 - Low income housing (HUD)
2 - Wastewater treatment plant (EPA)
3 - Highway improvements (scattered) (DOT)

▨ - FLOODPLAIN

THE CASE STUDY OF DEVELOPMENT IN THE PAPILLION CREEK WATERSHED, OMAHA, NEBRASKA*

The City of Omaha is a major city of Nebraska, located on the Missouri River on the eastern border of the State. The City is the largest market and meat-packing center in the world, as well as one of the leading grain markets in the United States. Other manufacturing in the City ranges from electronic equipment to communications equipment, trailers and farm equipment. The City is also a major transportation terminal in the Midwest.

Growth trends in the City reflect the economic prosperity. In 1960, the total population of Omaha was approximately 300,000. By 1970 the population had increased to 357,000 and by 1977 to 378,000. The rate of growth has been steady to date and is expected to continue, with both inner-city redevelopment and suburban development sharing in the benefits.

Omaha's topography is characterized by ridges and valleys running parallel, rather than perpendicular, to the Missouri River. The Creeks running through the City do not join the Missouri River until they are south of the City. Reflecting the topography, floodplains run in parallel lines, bisecting the City. At normal water levels, the Creeks span a width of ten to fifteen feet and, in some locations, the Creeks have eroded 30 feet into the creekbeds. Floodplains adjacent to several of the Creeks range from one-quarter to one-half mile in width.

The major floodplains in Omaha are along the inland Creeks rather than along the Missouri River, because levees along the River serve as a flood prevention mechanism. The drainage basin of the Little Papillion Creek, Big Papillion

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*Case study based on interview with Mr. Alden Aust, City Planning Director, City of Omaha, Nebraska and Mr. Wayne Wiley, Environmental Planner, Omaha-Council Bluffs Metropolitan Planning Agency, March 27, 1978.

Creek, and West Branch Papillion Creek has, therefore, been selected as the study area.

The significance of the floodplain was emphasized in 1964 when a sudden, concentrated storm caused extensive flooding damage and some loss of lives along the Big Papillion and West Branch Creeks. This type of intense flood, caused by heavy runoff in a small drainage basin rather than snow melt, is characteristic of the area. In response to the flooding problem, the City adopted new zoning and building regulations in 1964 which limited construction in the floodplain and required flood-proofing for all structures that were built.

The Papillion Creek Watershed encompasses two-thirds of the land area in the City of Omaha. A wastewater treatment plant and outfall sewer have recently been constructed to serve properties in the watershed. The treatment facilities have replaced older treatment systems and have also extended wastewater treatment service to some undeveloped areas.

An estimated 3-4 percent of the floodplains adjacent to West Branch, Big Papillion and Little Papillion Creeks are presently developed. The urban development in the floodplains includes residential, commercial, and industrial uses, although no residential development has occurred for more than twenty years. Most of the floodplain is in agricultural cropland.

In 1976, dam site 11 was developed at the north end of Little Papillion Creek. The dam was constructed for flood control purposes and has affected the location of the floodplain. In effect, the reservoir has protected lands which were originally in the natural floodplain, changed the location of the floodplain, and hence allowed development to occur in areas which otherwise would not have been developed.

The following federal programs have taken place in the "original" floodplain of the Papillion Creek Watershed. Programs are listed in chronological order below:

1958 - to present	Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate Highways 580, 680, and 80, which cross the floodplains in several places. Several major interchanges are located in the floodplains. Bridge improvements on other highways have also been completed.
1958 -	Congressional authorization for the U.S. Army Corps of Engineers to undertake a major flood control program for the Missouri River, including construction of levees.
1962 -	National Flood Insurance Program, U.S. Department of Housing and Urban Development - the City of Omaha was one of the first cities in the United States to enter the program.
1970 - to 1976	Land and Conservation Fund Program, U.S. Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - acquisition and development of several parks on Big Papillion Creek.
1976 -	Urban Studies Program, U.S. Army Corps of Engineers - water resources study including wastewater treatment needs, growth management, and floodplain management undertaken.
1976 -	Public Works Program, U.S. Army Corps of Engineers - completion of construction of dam site 11 on Little Papillion Creek. Dam site 16 on the Big Papillion Creek was completed near this date. Construction of 26 dams were proposed.
1976 - to 1977	'701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - City of Omaha planning grant received. The Omaha-Council Bluffs Metropolitan Planning Agency has

received funds through the '701' Comprehensive Planning Assistance Program which have been used for planning the general framework for the metropolitan area.

1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of a wastewater treatment plant and outfall sewer completed.

1978 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of an interceptor relief sewer near the Little Papillion Creek in order to increase sewer capacity during peak load times.

In addition, the construction of dam 3A northwest of Omaha on Big Papillion Creek has been proposed. If constructed, the dam will remove 75-85 percent of the land presently in the floodplain from floodprone status.

Two types of federal programs, reservoir construction projects and wastewater treatment and conveyance facilities, have affected growth and development in and near floodplains in the Papillion Watershed. The ways in which these programs have affected development are summarized below.

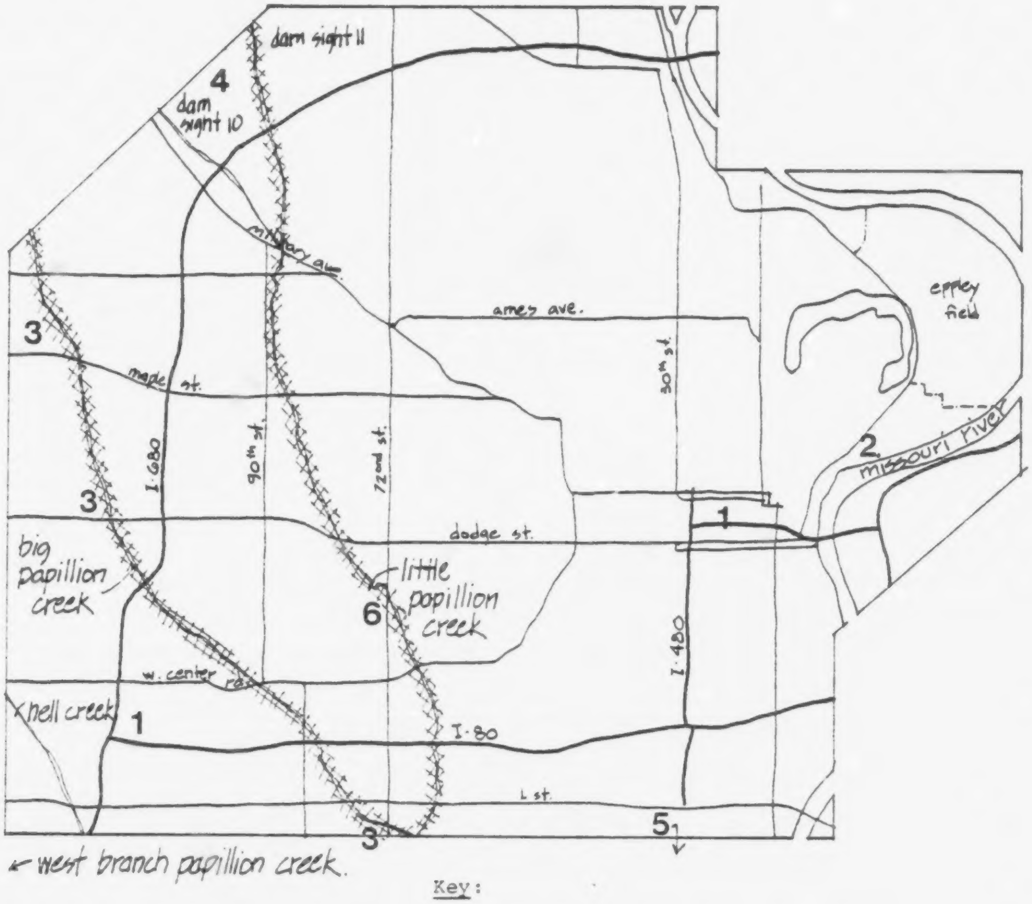
The Corps of Engineers reservoirs have affected floodplain development in cases where the flood protection value of the reservoir is sufficient to remove sizeable land areas from the floodplain. When the land is removed from the floodplain, it is no longer subject to the floodplain regulations of the City of Omaha and development can occur. The public works reservoirs, therefore, allow development to occur. The construction of Dam number 11, resulting in a lake of 600-700 acres on the northern reaches of Little Papillion Creek, for example, has had a major effect on growth and development. The dam construction has changed the extent of the floodprone area downstream. The construction of Dam 16 on the Big Papillion has not had that effect. (Dam 16 was proposed as one of a series of dams but the other sites were not developed.)

In the City of Omaha, development on septic tanks is prohibited. Public wastewater treatment facilities are, therefore, a prerequisite to urban development. The recent construction of wastewater treatment facilities through the '201' Wastewater Treatment Works Program and the Public Works Program of the Economic Development Administration have encouraged growth in some locations. Since floodplain development is restricted by local ordinances, however, development in floodplains is not expected.

The only federal program discouraging floodplain development is the National Flood Insurance Program which has in part led to the efforts of the City to regulate floodplain development. The Program and regulations have had the desirable effect of protecting lives and property from flood hazards.

Due to flooding hazards and the floodplain regulations of the city, very little development in the floodplains has taken place. Construction of upstream dams by the U.S. Army Corps of Engineers has not encouraged floodplain development but has reduced the limits of the floodprone area below these structures. Development of floodprone areas is not anticipated in the future.

Omaha,
Nebraska



Key:

1 - Interstate 560, 680, & 80 (DOT)
2 - Levee (Army Corps of Engineers)
3 - City parks (HCRS)
4 - Dam site 10 (Army Corps of Eng.)
5 - Wastewater treatment plant (EPA)
6 - Interceptor relief sewer (EDA)

▨ - FLOODPLAIN

CASE STUDY OF FLOODPLAIN DEVELOPMENT IN DAVENPORT, IOWA*

The City of Davenport, Iowa, located on the eastern edge of the State of Iowa along the Mississippi River, is one of four major cities forming a bi-state metropolitan area. The other cities are Rock Island, Moline, and East Moline. In addition, several smaller cities (Bettendorf, Riverdale, and Panorama Park) are located near Davenport on the western side of the River.

In 1960, the population in the Iowa portion of the urbanized area was 101,000 and in 1970 the population was 126,000.[1] The estimated 1975 population was 130,000 persons. The slight decrease in population is difficult to explain since a continued growth in housing starts was experienced. In 1975, the estimated population of the urbanized area was approximately 130,000 persons.

Agricultural processing, farm equipment, and defense-related industries dominate the Davenport economy. The metropolitan area is the headquarters for the U.S. Army Armament Material Readiness Command, U.S. Department of the Army, and other research and engineering operations related to the national defense.

The major floodplains in the bi-state metropolitan area are adjacent to the Mississippi River. On the eastern shore, however, a 12-15 foot levee constructed by the U.S. Army Corps of Engineers in 1972 protects much of downtown Rock Island from serious flooding. There is no similar protective structure on the western shore to protect Davenport, although studies have been completed and financial assistance from the U.S. Army Corps of Engineers has been requested.

The 100-year floodplain of the Mississippi River is broad, extending the full length of the downtown area in Davenport and extending inland several blocks. The floodplain of the

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* Case study based on interview with Mr. Douglas Davie, Principal Planner/Engineer and Mr. Clayton Lloyd, Principal Planner, Bi-State Metropolitan Planning Council, March 9, 1978.

[1] The 1970 population included more than the cities of Davenport, Bettendorf, Panorama Park, and Riverdale.

Mississippi extends six miles along the entire urbanized area and includes areas of Bettendorf and Riverdale, as well as Davenport. The floodplain is either developed land, vacant urban land, agricultural, or used for a park. Downstream a short distance from Davenport, however, the land adjacent to the River becomes marshy. Much of this area is the Upper Mississippi National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service.

Three small creeks, Duck Creek, Goose Creek and Black Hawk Creek, flow through the City of Davenport before joining the Mississippi River. The floodplains range from 200 to 1,000 feet wide on either side of the creeks and can create flooding hazards during storms. Therefore, the study area for this case study includes the four major floodplains on the western side of the River: the Mississippi River, Duck Creek, Goose Creek and Black Hawk Creek.

Flood hazards are a major concern in the City of Davenport. Major floods in the City from the Mississippi River occurred in 1952 and 1965, and have led to a request for the construction of levees and other flood control structures by the U.S. Army Corps of Engineers. Localized flooding is also experienced along the three creeks during major rain storms.

Approximately 50 percent of the floodplain along the Mississippi River is developed for urban-related uses. A portion of downtown Davenport is in the floodplain. Industrial sites are located in floodplain areas in Davenport, Bettendorf, and Riverdale. Some residential development is located along a portion of the floodplain in Davenport, Riverdale, and Bettendorf. A number of river-front sites which could be developed for industrial or commercial use are presently undeveloped. Little new residential construction in the floodplain has taken place in the past decade.

More than 50 percent of the Duck Creek floodplain is open space, acquired for the parkway and bikeway. A small amount of residential and commercial development is located in the floodplain. The upper reaches of Goose Creek and Black Hawk Creek are largely undeveloped, but residential uses are found in downstream areas.

Urban development is located in the floodplain for several reasons. Some development has taken place because the precise geographic limits of the floodplain were not known when the subdivision was approved or because flood boundary delineations were revised when new information became available. In other cases, development has occurred because there are no floodplain regulations. A new, expanded wastewater treatment plant serving Davenport, Panorama Park, Riverdale, and Bettendorf has recently been completed. For engineering reasons, the interceptor for the plant follows the Mississippi River floodplain. The treatment plant serves existing development in the floodplain as well as developed and undeveloped areas outside of the floodplain.

The following federal programs have taken place in floodplains or have affected floodplain development in the City of Davenport:

1960's - Federal-Aid Highway Program, U.S. Department of Transportation - initial construction of U.S. Highway 61 through the floodplain.

1966 to present - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - ongoing land use planning activities of the Bi-State Metropolitan Planning Commission.

1970's - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - acquisition and development of floodplain along Duck Creek as a City park and bikeway.

1972 1976 - Planning for the Davenport Flood Control Project, U.S. Army Corps of Engineers - General Design Memorandum describing the proposed levee and flood control structures for the City of Davenport completed.

1972 - Federal-Aid Highway Program, U.S. Department of Transportation - completion of Interstate 74 through Bettendorf and Davenport. The Bettendorf portion of I-74 is either in or elevated above the floodplain of the Mississippi River.

1974 to 1975 - Federal-Aid Highway Program, U.S. Department of Transportation - completion of Interstate 280 through Davenport.

1970 to 1972 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - land use planning activities completed by the City of Bettendorf.

1975 to 1976 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - land use planning activities completed by the City of Davenport.

1977 - Urban Studies Program, U.S. Army Corps of Engineers - completion of Plan of Study for an urban studies program.

1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - completion of new wastewater treatment facility serving Davenport, Panorama Park, Bettendorf, and Riverdale (planning for the facility was initiated in the early 1960's).

1978 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - The City of Davenport has recently adopted floodplain regulations which prohibit development in the floodway portion of the floodplain and require certain standards of construction for other portions.

In addition to these federal construction and planning projects, the federal government owns and manages the Rock Island Arsenal and related facilities on the islands in the Mississippi River adjacent to Davenport, as well as the Upper Mississippi National Wildlife Refuge.

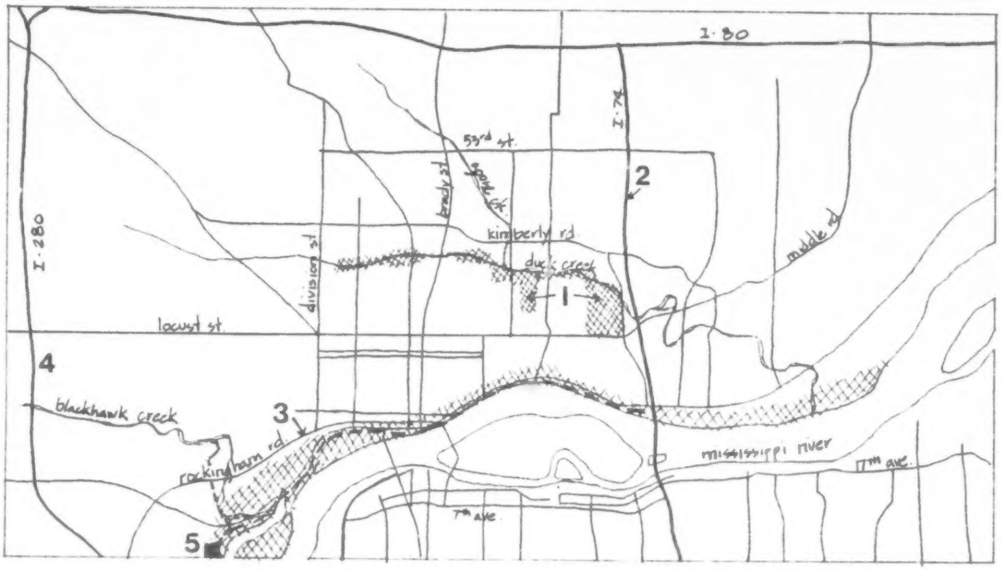
Apart from the Land and Water Conservation Fund Program of the Heritage Conservation and Recreation Service (formerly, the Bureau of Outdoor Recreation) and the National Flood Insurance Program, federal planning and construction programs have not had an effect on floodplain development to date. The Land and Water Conservation Fund Program has had the direct effect of creating public parkland in the floodplain and removing development possibilities. Through the National Flood Insurance Program as well as ongoing concern about flood hazards, Davenport has adopted floodplain protection regulations.

Although the interceptor for the new wastewater treatment facility funded through the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency is located along the Mississippi River floodplain, it has not affected growth and development in the floodplain. Natural flood hazards, topography, and the floodplain regulations being adopted by the City of Davenport have discouraged floodplain development in the past and are expected to do so in the future.

If federal funding through the U.S. Army Corps of Engineers can be obtained for the construction of a levee along the Mississippi River, development in the present floodplain will definitely be affected. The result of new levee construction would be to remove certain areas from the floodplain and from flood hazard dangers. Economic development pressures are expected to lead to development in areas of the downtown which had previously been located in the floodplain. According to regional planners interviewed, the levee construction would stimulate development.

In summary, although some floodplain development has taken place in the past, future floodplain development is not anticipated. Federal programs have encouraged the protection of the floodplain as a public resource and for protection of lives and property. Levee construction by the U.S. Army Corps of Engineers in the future is expected to change the location of the 100-year floodplain by providing flood protection and, as a result, encouraging development in Davenport's downtown area.

Davenport,
Iowa



Key:

1 - Duck Creek Park, acquired and developed through the Land and Water Conservation Program
2 - Interstate Highway 74
3 - U.S. Highway 61
4 - Interstate Highway 280
5 - '201' wastewater treatment plant and interceptor

▨ - FLOODPLAIN

CASE STUDY OF FLOODPLAIN DEVELOPMENT, COUNCIL BLUFFS, IOWA*

The City of Council Bluffs, Iowa is located on the western border of the State of Iowa, across the Missouri River from Omaha, Nebraska. Beef packing, grain storage, and activities related to the railroads are the major employers in the area. Council Bluffs is a major center for a rich agricultural area.

The present population of the City is 61,600, a small increase over the 1970 population of 60,300. The 1960 population was 55,600. These figures indicate a slow-moderate growth trend in the City.

The City of Council Bluffs is partially situated in the floodplains of the Missouri River, Mosquito Creek, and Indian Creek. Flooding has been caused by rapid snowmelt,ice, heavy rainfall, or a combination of factors. Because a series of federal programs have affected development in the floodplain of Indian Creek, this single floodplain has been selected as the study area for this case example.

It is of interest to note that flooding from the Missouri River is no longer a problem in Council Bluffs. Construction of six dams and reservoirs on the Missouri River in the Dakotas and Montana and construction of a levee system in the Omaha-Council Bluffs area, provide protection from the 500-year flood. All areas east of the levee, including the Indian Creek floodplain, are protected from Missouri River floods.

The downtown area of Council Bluffs is located two miles inland from the Missouri River. Indian Creek flows through the northeast area of the City to the Missouri River and creates flooding hazards for the downtown and adjacent areas. Indian Creek flows through a culvert 12-15 feet deep before it reaches downtown. In the downtown, the Creek flows through an enclosed conduit. The floodplain of Indian Creek includes a major portion of the downtown business area and the Tinley neighborhood, a residential area just north of downtown.

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*Case study based on interview with Mr. Leo Wilensky, Director; Mr. John Beer, Jr., Assistant Director; Mr. Ronald Hooper, Planner; and Ms. Elizabeth Hruska, Planner, Council Bluffs Department of Planning and Community Development. Mr. Wayne Wiley, Environmental Planner, Omaha-Council Bluffs Metropolitan Planning Agency also participated in the meeting held March 27, 1978.

The floodplain area in the downtown and Tinley area is completely developed. Downtown structures include commercial and office buildings, including Midlands Mall, a major shopping and office complex built on land made available through the City's urban renewal program. The downtown has experienced steady development and improvements, and there are several new office buildings. New public and community buildings include the YMCA, the City pool and fire station.

The Tinley area is an older, residential neighborhood. Prior to the construction of levees on the Missouri River, the area was subject to flooding. The area is now removed from the floodplain of the Missouri River and some construction of newer homes has taken place. Low-moderate income families live in the area and a City-sponsored rehabilitation project is underway.

The following federal planning and construction programs have taken place in the downtown and Tinley areas of Council Bluffs:

1930's - Works Project Administration (WPA)-project to construct the culvert for Indian Creek (originally designed to control flood waters).

1950's - Public Works Program, U.S. Army Corps of Engineers - construction of system of levees along the Missouri River adjacent to Council Bluffs.

1960's - Urban Renewal Program, U.S. Department of Housing and Urban Development - urban renewal clearance project sponsored by the City of Council Bluffs for the downtown area.

1968 - Special Sewer Study, U.S. Department of Housing and Urban Development - study of sewer separation needs, including recommendations for construction of separate storm sewers.

1968 - Construction of initial wastewater treatment plant through a grant from the Federal Public Health Agency.

1974 to 1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - completion of the Mosquito Creek Treatment Plant serving the City of Council Bluffs.

1976 to present - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - residential rehabilitation project sponsored by the City in the downtown and Tinley area (among other areas of the City).

1978 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - housing rehabilitation project in the Tinley area initiated (other rehabilitation projects in the City have been underway since 1976).

1978 - Federal-Aid Highway Program, U.S. Department of Transportation - construction of the Washington Street bypass in the downtown initiated, with completion scheduled for 1981.

1978 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - storm sewer construction in Tinley neighborhood proposed.

The City is presently in the "emergency phase" of the National Flood Insurance Program and is in the process of adopting the required floodplain ordinances.

The Urban Renewal Program of the U.S. Department of Housing and Urban Development and the construction of the Missouri River levees have had definite positive effects on growth and development in the study area, according to the Council Bluffs Department of Planning and Community Development. The National Flood Insurance Program is expected to restrict development in the downtown area in the future, which is a concern to the City of Council Bluffs.

The effect of the Urban Renewal Program has been most significant. Through the program, dilapidated structures in the downtown area were removed and sufficient land assembled so that large-scale redevelopment could proceed. Midlands Mall, a major specialty shopping and office complex in downtown Council Bluffs, could not have been constructed without the Urban Renewal Program. Midlands Mall, in turn, is an attraction which is bringing development and economic activity to the downtown.

The Missouri River levees have had an effect on growth and development by greatly reducing the frequency of floods from the Missouri River. Development occurred in the floodplain prior to the construction of the levees; however, after construction, some infilling of development took place and areas became more suitable for residential development.

The National Flood Insurance Program will potentially discourage development in the floodplain. The City of Council Bluffs supports the Program and local regulations for flood damage protection, although City officials are concerned about the economic impact of the Program. The likely effect of the regulations, however, will be to discourage some new growth in the downtown.

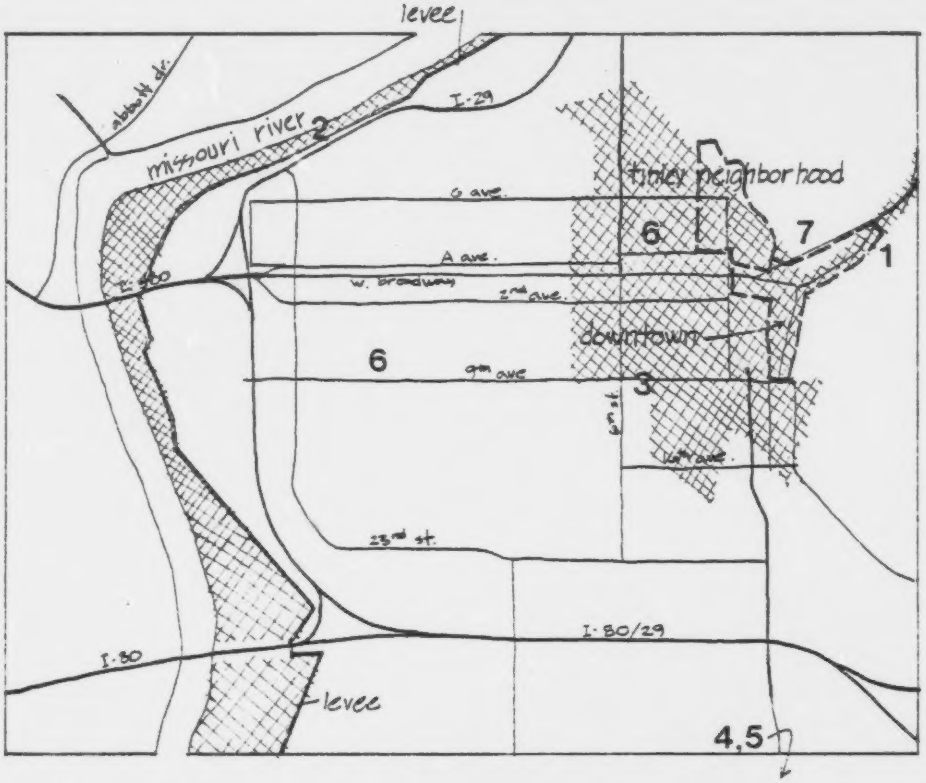
The largest flood ever recorded along Indian Creek occurred in 1942 and was classified as a 25-year flood. City planners believe, therefore, that the 100-year floodplain boundary designated by the U.S. Department of Housing and Urban Development through the National Flood Insurance Program does not accurately reflect flood hazards.

Although the Works Project Administration program for the construction of the Indian Creek culvert was considered to be a public benefit at the time, the real effect of the culvert on flooding in Council Bluffs is not known. According to city planners, the culvert may intensify flooding in certain areas by funneling and directing the rushing waters and prevent flooding in other areas.

The Mosquito Creek Wastewater Treatment Plant replaces an older facility (also constructed with federal funds). Because the downtown and Tinley neighborhood previously had sewer service, the construction of the new plant has not had an effect, either positive or negative, on growth and development in these areas. Outside of the study area, however, the treatment plant has stimulated growth. In outlying areas of Council Bluffs where sewer service was not previously available, the treatment plant and related facilities have made it possible for development to occur. Septic tanks create environmental problems in fringe areas of the City and wastewater treatment service is necessary for the development of land at urban densities in those areas.

In summary, federal construction programs have had a significant positive effect on growth and development in the downtown and Tinley neighborhood areas of Council Bluffs. In the future, the National Flood Insurance Program is expected to hinder redevelopment in the downtown, although development will not be completely shifted. To continue the desirable development trends in downtown Council Bluffs, continued federal program assistance is considered to be essential.

Council Bluffs,
Iowa



Key:

1 - Indian Creek Culvert (WPA)
2 - Levee (Army Corps of Engineers)
3 - Urban renewal (HUD)
4 and 5 - Wastewater treatment plants (EPA)
6 - Urban renewal rehabilitation (HUD)
7 - Washington Street Bypass (DOT)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN NORTH KANSAS CITY, MISSOURI*

A portion of Kansas City, Missouri is located north of the Missouri River, separated from the downtown and major portion of the City. The area of the City north of the Missouri River comprises more than 50 percent of the total City area.

A major '201' wastewater treatment facility is being planned and designed to serve an area 20 square miles in size located just north of the Missouri River. The facility, when constructed, will serve areas within Kansas City, as well as the communities of Avondale, Birmingham, Gladstone, Liberty, Claymoco, and Pleasant Valley. The projected service areas' boundaries have been selected as the study area for this case.

The study area is experiencing steady, moderate growth. Although the population is difficult to estimate, planners indicate that a 5 percent population increase has been experienced in the area every five years. It is believed that the population of the study area comprises more than 80 percent of the total Clay County population. Since the 1973 Clay County population was 131,000, a population of 100,000 is estimated.

The study area has developed in an irregular fashion, with developments concentrated around the established communities and along the major roads and highways which bisect the area. Land uses for the most part, are balanced since land in the study area is devoted to commerical, industrial, and agricultural and residential uses. Agriculture is not as prominent in the study area as it once was. The decline in agricultural activity is related to the expansion of the Kansas City metropolitan area, and the nature of the land itself, which is rough and difficult to cultivate.

Major developments in the study area include the Worlds of Fun Amusement Park which now occupies 160 acres of land; the Great Midwest Industrial Center and Free Trade Zone which occupies underground cavern space created in Bethany Falls limestone by quarrying activities; and a transit-oriented industrial park.

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* Information for this case study based upon interview with Mr. Eugene Martens, Planner, City Development Department, City of Kansas City, Missouri, March 8, 1978.

The floodplain in the study area is associated with the Missouri River and a series of branching creeks which drain through the study area and empty into the River.

The floodplain of the Missouri, once expansive, has been reduced by a levee constructed in 1905 - 1910 by the U.S. Army Corps of Engineers. The levee system was constructed running from nearly the Platte County line east to Route 291. The levee system provides 500-year flood level protection. The land between the northern edge of the River and the levee is undeveloped, for the most part.

The floodplains of the creeks which wind through the study area are for the most part undeveloped. The floodplains are characterized by lush, dense vegetative growth which makes them attractive for both recreation and development. The preservation of the creek floodplains is largely attributable to a citywide program established in 1958 to purchase land for boulevard construction. In planning its boulevard systems, the City of Kansas City protected much roadside land to further the City's strong tradition in creating urban parks. The program provides an excellent example of early floodplain management integrated into a development project.

The City's floodplain protection efforts occurred during the late 1950's when areas north of the Missouri River were being annexed. Prior to annexation, when the study area was under county control, some floodplain areas were encroached upon. The most demonstrative example of this encroachment is the Rock Creek floodplain in and around Avondale.

The completion of the Birmingham treatment plant and the interceptor sewers leading to it will make possible the abandonment of numerous temporary treatment facilities in the Shoal Creek system. It will also allow construction of lateral systems in previously unserved areas without the burden of temporary plant construction.

Federal planning and construction programs occurring in the study area are presented below:

1950's-Flood Control Project, U.S. Army Corps of Engineers - improvement to the flood protection levee on the north side of the Missouri River in the Birmingham area.

1960's-Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate Route 35.

1960's-Federal-Aid Highway Program, U.S. Department of Transportation - improvements to Missouri Route 291.

1960's-Federal-Aid Highway Program, U.S. Department of Transportation - construction of Parvin Road.

1970 - Section 236 Housing Assistance Program, U.S. Department of Housing and Urban Development - construction of "Parvin Estates", a low-moderate-income housing project.

1970's-Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate Route 435.

1970's-Federal-Aid Highway Program - U.S. Department of Transportation - construction of Missouri Route 210.

1975 - '201' Wastewater Treatment Facilities Program, U.S. Environmental Protection Agency - grant for construction of treatment plant and interceptor.

1975 - '701' Comprehensive Planning Assistance Program, U.S. Department of Housing and Urban Development - planning assistance grants for preparation of comprehensive plans.

The City of Kansas City participates in the National Flood Insurance Program administered by the U.S. Department of Housing and Urban Development.

According to Mr. Eugene Martens, a planner with the City of Kansas City, federal programs have influenced growth and development in the study area, but have not been a stimulus to floodplain development. The major growth and development effects have resulted from federal highway programs.

Since the City of Kansas City began annexing land in the study area, a number of significant highway programs have been constructed. Interstate 435 bisects the study area from north to south. Interstate 35 passes through the study area on a diagonal from northeast to southwest. Missouri Route 210 constitutes the southern edge of the study area following a course roughly parallel to the Missouri River. Missouri Route 291 is a north-south route at the eastern edge of the study area. Parvin Road, running between I-435 and I-35, was also constructed with federal financial assistance.

The influence of these highway programs on growth and development in the study area has been great. Missouri Route 291 opened up the community of Liberty to residential development by commuters to Kansas City. Missouri Route 210 resulted directly in the development of the 100 acre International Trade Center East industrial park. Worlds of Fun, the largest amusement park in the midwest, was provided access by I-435. Development along Parvin Road has also been occurring at a constant rate.

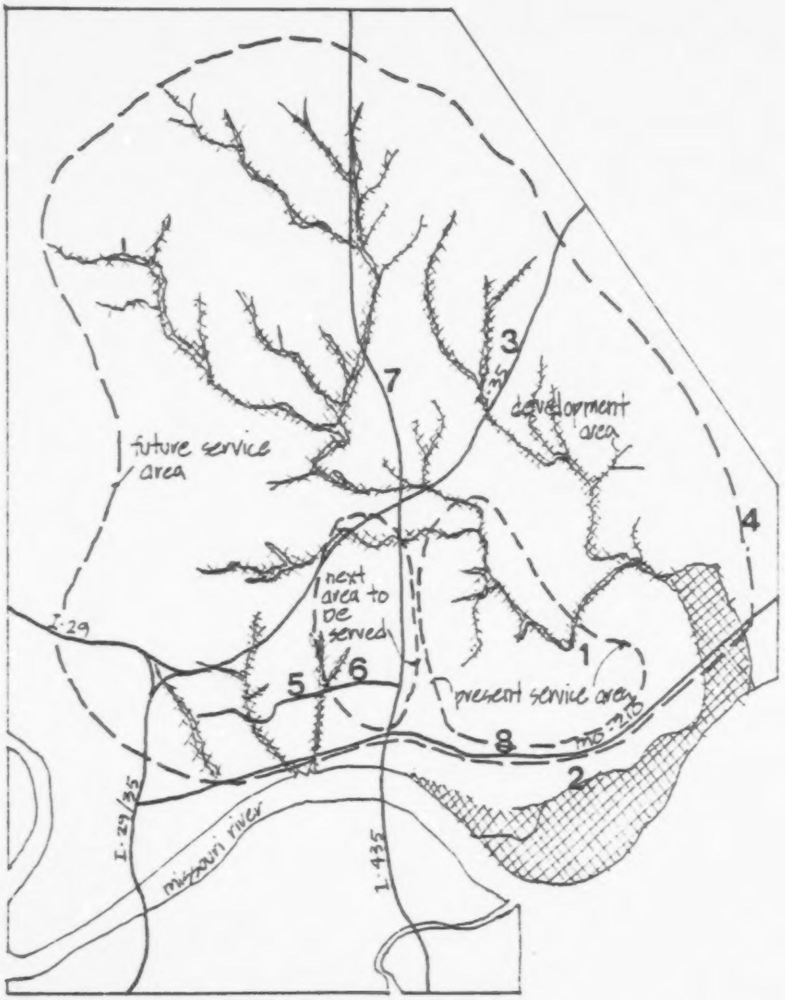
Generally, therefore, federal highway programs have stimulated growth and directed development patterns within the study area. According to Mr. Martens, this growth has been consistent with good floodplain guidelines. Planners have not observed any flooding attributable to highway construction, and development has, for the most part, not occurred in floodplain areas. Floodplain pressures are being realized along Parvin Road, but the availability of other land suitable for development is expected to mitigate floodplain development pressures.

Mr. Martens does not believe that the new wastewater treatment facilities presently under construction will create pressures for floodplain development. Again, the availability of land for developemnt outside of floodplain areas is cited as the reason. The facilities do, however, allow development to occur in greater density than would otherwise be possible.

The levees constructed by the Army Corps of Engineers have also allowed development to occur. Although the levees altered the location of the floodplain, they did not stimulate floodplain development.

In summary, federal programs have had strong influence on both the amount and location of developments in the study area. Federal programs have not, however, stimulated the development of study area floodplains.

North Kansas City,
Missouri



Key:

1 - Wastewater treatment plant (EPA)
2 - Levee (Army Corps of Engineers)
3 - Interstate 35 (DOT)
4 - Highway 291 (DOT)
5 - Parvin Road (DOT)
6 - Parvin Estates Housing (HUD)
7 - Interstate 435 (DOT)
8 - Highway 210 (DOT)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE BITTER AND KILLPECKER CREEK RIVER BASINS, CITY OF ROCK SPRINGS, WYOMING*

The City of Rock Springs is the largest city in Sweetwater County, Wyoming, the largest county (10,000 square miles) in the State. Rock Springs is located at the confluence of Bitter and Killpecker Creeks in the middle of the County. Sweetwater County is located in southwestern Wyoming, adjacent to the Utah and Colorado borders.

The most important occurrence in Sweetwater County during the past several years has been the construction of the Jim Bridger Power Plant, a mouth-of-mine, coal-fired, electricity generating facility. This plant and related mining has drawn thousands of new residents to the area. Mining, especially coal and trona; related support services, such as construction and equipment leasing and maintenance; and burgeoning services to the new residents have placed tremendous development pressures on this community.

Between 1970 and 1978 the population of Rock Springs increased from 11,000 to 27,000, an increase of 150 percent. Sweetwater County's population has grown since 1970 at an average annual rate of 19 percent to the present level of 38,000 persons.

Because of the rapid growth, housing is a critical problem in the community. There is a waiting list for all apartments and trailer park vacancies, and the average length of time a home is on the market is five days. Trailer courts have proliferated throughout Rock Springs, nearby Green River and surrounding Sweetwater County. These courts are often built on unstable ground prone to flooding and erosion,and sewer service may be rudimentary, occasionally with open drainage directly into a creek bed.

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* Case study based on interview with Mr. Leon Kjellgren, Rock Springs City Engineer, and Mr. Dennis Watt, Sweetwater County Planner. Representatives of the Rock Springs Chamber of Commerce and the Wyoming State Planning Coordinator's office were also contacted to obtain background documents.

The City of Rock Springs was chosen as the study area because it contains virtually all federal activity which has occurred in the County and is the service area of the sewage treatment plant.

This is a semi-arid region. Therefore, creek beds are usually filled with little water and are subject to widespread flooding when they do fill. According to U.S. Army Corps of Engineers' floodplain designations for the City of Rock Springs, over half the town is in the 100-year floodplain of Bitter and Killpecker Creeks. As the city engineer explained, this 100-year floodplain is designated based on some extreme assumptions, such as that the crests of the two creeks' floods will simultaneously reach their confluence in downtown Rock Springs. The floodplain designations are being renegotiated between the Corps and the City, since the City wants them reduced. For the purposes of this discussion, the presently designated floodplains will be used.

Killpecker Creek flows southerly through the northern half of Rock Springs into Bitter Creek. The floodplain is from 100- to 2,000-feet wide, but is generally characterized by fairly well-defined banks and quite a bit of development within the floodway. Killpecker Creek runs parallel to and usually about 200-feet from Highway 187, a major arterial leading into downtown Rock Springs from the north. The area between the Creek and highway is generally commercial associated with automobiles and traveling...service stations, motels, restaurants, etc. To the west of the Creek, several trailer courts have been constructed in the floodplain, as have mixed industrial uses, such as warehouses and equipment storage sites.

Killpecker Creek is filled with sediment, trash and many small appliances, all of which would contribute to severe flooding. There is, obviously, a great deal of drainage from service stations and parking lots (oil) directly into the Creek.

Bitter Creek runs through the City from east to west, draining into Green River about 12 miles to the west of Rock Springs. On its eastern reach, the southern bank of the

Creek is well-defined as it is contained by a railroad embankment. North of the Creek, a bus garage (with considerable runoff into the Creek) and a single-family residential area are located within the designated floodplain.

In the downtown area, virtually all of the central business district is located in the floodplain.

As the Creek proceeds to the west through town, it generally follows the Union Pacific Railroad embankment on the east and Denver Drive, a major commmercially-lined arterial, on the west. The commercial and some residential development on the west of the Creek is in the floodplain, as is the industrial storage between the Creek and railroad tracks to the east.

The existing sewage treatment plant (1 mgd) is located in southwestern Rock Springs on Bitter Creek. A new plant (2 mgd) is being constructed further southwest on the Creek on land recently annexed by the City; it will be completed in the Fall of 1979. The average daily flow will be about 1.7 mgd when the new plant is completed. The system has been designed to take "shocks", that is, overloads in quantity and quality of wastewater, for brief periods.

Rock Springs has recently annexed two areas of Sweetwater County to the west (1975) and south (1978) of town. Neither area is within the designated floodplain.

The entire community of Rock Springs, including adjacent areas, was selected as the study area in order to obtain insights about development both in and outside of floodplains. Projects which have affected development in the floodplain areas are specially noted.

There have been a number of federally-assisted activities in Rock Springs, many of which are still occurring. Chronologically, these include:

1930's-Work Projects Administration - Labor used to straighten some channels leading into Bitter Creek and extend riprap along banks.

1960 to 1965 - Federal-Aid Highway Program, U.S. Department of Transportation - completed construction of Interstate 80 through the City; some widening and improvements are being made at present.

1970 to date - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - improvements to several city parks, several of which are partially in the floodplain.

1978 to 1978 - Section 8 Housing Program, U.S. Department of Housing and Urban Development - three housing assistance projects, none of which are in the floodplain.

1975 to 1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - grants made for planning, design and construction of a new sewage treatment plant southwest of Rock Springs. Construction grant included monies for connector between new and existing plant and extension of the collector system along Killpecker Creek to the northwest.

1975 to 1978 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - block grants being used to rehabilitate several houses throughout the City and straighten streets in downtown Rock Springs, much of which is in the floodplain.

1977 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of new city hall located in designated floodplain.

1977 - Federal-Aid Highway Program, U.S. Department of Transportation - construction of Belt Road, portions of which bridge the floodplain.

Ongoing - Bureau of Land Management, U.S. Department of the Interior - selling of federal lands in White Mountain Reservation Area in northwestern Rock Springs, some of which is adjacent to Killpecker Creek floodplain.

Ongoing - U.S. Postal Service - constructing new regional post office, located southwest of confluence of Bitter nad Killpecker Creeks in the floodplain.

In addition to these activities, the Veteran's Administration and Federal Housing Administration make many single-family loan guarantees, many of which are located in or adjacent to the floodplain.

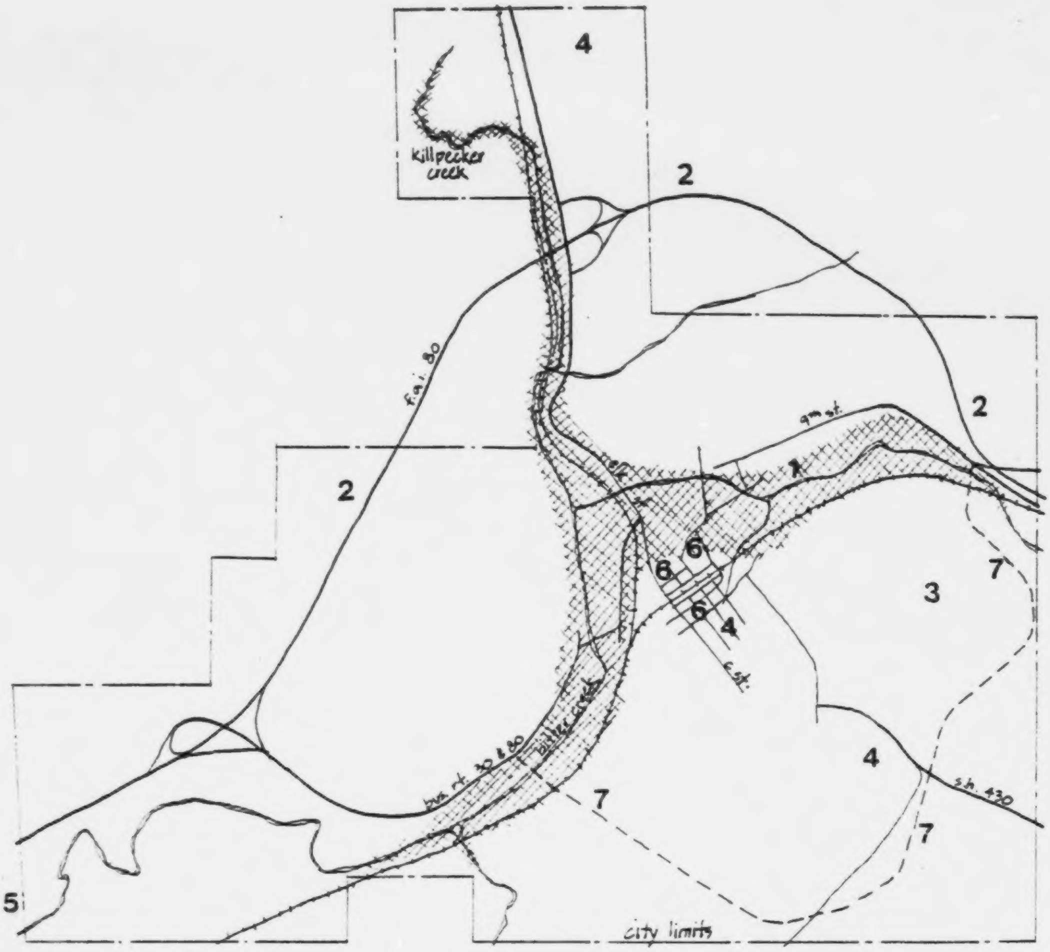
Rock Springs adopted amendments to its zoning ordinance in 1974 to cover floodplains. No floodplain zones (F-2) have been designated in the City. Sweetwater County has no floodplain provisions in its code.

According to persons interviewed, the only federal actions which have influenced the growth of Rock Springs are the provision of the sewage treatment plant expansion and the large holdings of federally-owned land within and near Rock Springs. In the first case, without U.S. EPA funding of the new plant and especially the connections to the northern section of Rock Springs, development in that area could not have occurred at the densities which are expected. Septic tank systems would have been overloaded and a health hazard would have soon existed. While largely remedial, the sewerage system is allowing continued residential expansion, some of which inevitably must be in or near the floodplains.

The large amounts of land held by the federal government in and near Rock Springs have limited the availability of developable land. The Bureau of Land Management, U.S. Department of the Interior, is now beginning to sell acreage in the White Mountain area north of town and development will inevitably spread to that area. Little of that property is in the Killpecker Creek floodplain.

Much construction which is federally-funded or directed in Rock Springs is located in flood designated areas. This is true of the new city hall (EDA), post office (Postal Service), several highways (DOT), improvements to city parks (HCRS) and housing rehabilitation (HUD). These projects, however, have not had an effect on secondary growth and development. The persons interviewed knew of no special concerns raised by federal agencies regarding these projects because of their location.

Rock Springs,
Wyoming



Key:

1 - Channel construction near Bitter Creek (Works Project Administration)
2 - Interstate highway 80 (DOT)
3 - City park improvements (HCRS)
4 - Section 8 housing (HUD)
5 - '201' wastewater treatment plant (EPA)
6 - Housing rehabilitation and downtown improvements (HUD)
7 - Belt Road construction (DOT)

▩ - FLOODPLAIN

CASE HISTORY OF DEVELOPMENT IN THE LITTLE BEAR RIVER DRAINAGE BASIN, HYRUM, UTAH*

The Town of Hyrum, Utah is a small municipality of about 3,530 population (1976 estimate) located in northeastern Utah in the drainage basin of the Little Bear River. Hyrum is about nine miles south of Logan, Utah, the county seat for Cache County. Cache County, located in northeastern Utah, is a rural, agrarian county with scattered, small towns located primarily along the north-south, major arterial highway, U.S. Highway 91. Hyrum is located in the southeastern quadrant of the County, as is shown on the map which follows.

Hyrum contains many large lots and small farms within its boundaries. The development of the Town has been of relatively small single family dwellings which are located on subdivided lots. There have been within the past five years several small subdivisions (25-30 units) built and some proliferation of mobile and prefabricated homes in the environs.

Hyrum is the fastest growing area of Cache County. According to population estimates provided by the Utah Department of Health, the 1970 population of 2,340 persons increased to 3,530 persons in 1976, an increase of 1,190, nearly fifty percent in a six year period. A population of 4,500 persons is expected by 1980.

There is one rendering plant and two large meat packing plants in Hyrum, each with its own wastewater facility (lagoons). There are also several nearby cheese processors. Utah State University, located in Logan, is one of the County's primary employers. Hill Air Force Base, located about 40 miles south in Ogden, also provides employment for people from Hyrum, although agriculture continues to be a predominant category of work.

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* Case study based on interviews with Mr. Bruce King, Executive Director, Bear River Association of Governments; Mr. Gale Larson, Valley Engineering Inc. (engineers for Hyrum's collection and treatment facilities); Mr. Bruce Wright, Cache County Planner; Mr. Willard Hill, District Health Officer, Utah Department of Health; and Mr. Robert Holt, '208' Study Coordinator, Bear River Association of Governments.

The vicinity of Hyrum has been the fastest growing area of Cache County for two reasons: 1) the availability of land with water supplies, and 2) a generally favorable town attitude toward expansion. Hyrum has recently annexed an area to the east of town which is about one-third the size of the existing town.

There is little floodplain area in Hyrum. The Hyrum Slough bisects the Town on a north-south axis and is characterized by large-lot agricultural development along its steep banks with natural drainage of animal wastes into the ravine for an average of 150 to 200 feet on either side. On the southern end, the Slough drains into the Hyrum Lake. Because of the large lots lining the Hyrum Slough, availability of other lands suitable for development, and an extremely high watertable, there has been initially no building in Hyrum in the floodplain.

Because the floodplain in the Town of Hyrum is relatively narrow and undeveloped and several significant federal projects and private developments have occurred just outside of the Town, an area approximately one mile from the Town limits in all direction was chosen as the study area.

Few federal actions have taken place in the vicinity of Hyrum. Those which have are listed below in chronological order:

1932 - Bureau of Reclamation, U.S. Department of the Interior - construction of Hyrum Lake, a major irrigation lake located adjacent to the southern limits of Hyrum. Subsequently, the State of Utah built a small park and marina on the north shore of the lake, providing no more than 3-4 jobs in the Town.

mid-1930's-The Soil Conservation Service, U.S. Department of Agriculture, has been actively promoting agricultural conservation through land management practices, SCS is presently an active participant in the Bear River Association of Government's '208' planning process and it is expected that the Soil Conservation Districts will be designated non-point management agencies.

1973 - Sewer and Water Facility Program, Farmers Home Administration - construction of a culinary water reservoir in Hyrum.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency, and Community Facilities Program, Farmers Home Administration - jointly-funded planning of an oxidation ditch and sewer collector system in Hyrum.

1976 - Land and Water Conservation Fund Program, U.S. Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - grant for park construction on the eastern edge of Town, away from the floodplain.

1976 to 1977 - Sewer and Water Facility Program Farmers Home Administration - construction of several new wells to supplement existing water supplies in Hyrum.

1977 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency, and Community Facilities Program ,Farmers Home Administration - grants for construction of an oxidation ditch and collector system for Hyrum. Construction of the entire system will be completed in several months.

1977 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - construction of lateral sewers to serve a Section 235 housing project planned for construction in 1978.

In addition, the Farmers Home Administration has been providing home mortgage guarantees on scattered sites throughout the Town since the mid-1960's.

The U.S. Environmental Protection Agency is presently funding a special study being conducted by Utah State University of algae control in Hyrum Lake. The Four Corners Regional Commission will fund a comprehensive utility needs study for the southern part of Cache County, including Hyrum, in 1979.

Hyrum adopted zoning and subdivision ordinances about three years ago. There are no special provisions to control floodplain development. The Bear River Association of Governments' '208' planning, being done under contract to the Utah Department of Health for the Bear River Basin, will result in provisions for floodplain control which will be recommended to local governments for adoption.

The planning and construction of the U.S. EPA- and FHA-funded wastewater collection and treatment facilities in Hyrum was precipitated by a severe problem with septic tanks in the vicinity. Because of the rapid growth in the early 1970's in Hyrum and the extremely high water table, problems developed with septic tanks by 1975 to such a point that the State Department of Health ordered the situation corrected. A moratorium on development was imposed by the District Board of Health limiting new construction to 30 units per year.

The oxidation ditch and collection system was necessary to alleviate the septic tank problem. The facilities were designed for a 1955 population of 6,600 persons. With the existence of the new treatment facility, this figure will be surpassed at least a decade earlier than expected.

There has been a significant problem with FHA-financed housing in the area, according to the District Health Office.

FHA financing limits the size of the lot on which new housing is to be constructed. Initial financing is for 2- and 3- bedroom homes with the capability to expand later. Septic tank sizes are approved by the District Health Office based on the initial housing sizes. Almost immediately upon construction, the owners expand their homes, often without a building permit. Septic tanks, sized too small, are overloaded. This problem, created in part through a federal program, has added to other septic tank problems.

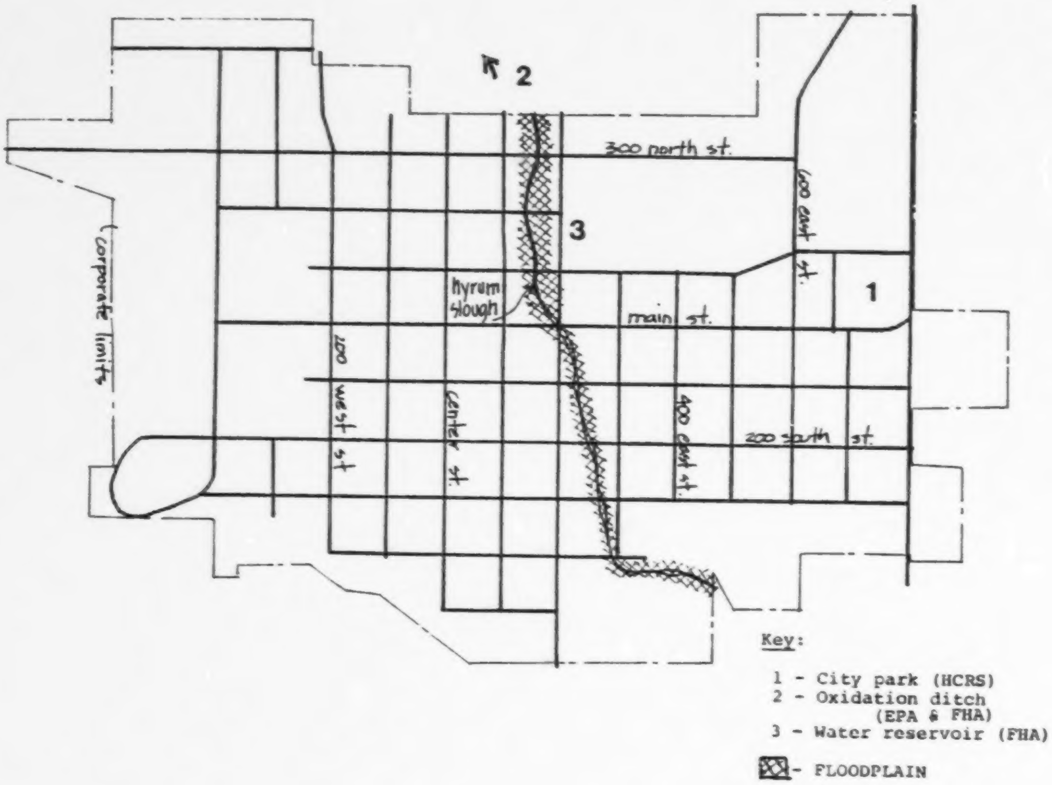
This problem has been partially corrected by the requirement by the District Health Office that septic tanks be sized for eventual expansion. This requirement is imposed by inspectors.

Persons interviewed unanimously agreed that the wastewater treatment and collection facilities funded by the U.S. Environmental Protection Agency and the Farmers Home Administration have corrected a problem which resulted from urban growth and development. The growth itself, however, was not stimulated by federal actions although home mortgage insurance through the Farmers Home Administration has made it possible for families to purchase homes. The major stimulus of the wastewater facilities was the natural problem of the high water table, which, in effect, is a natural lake lying under the Town. The need for wastewater treatment facilities was not stimulated by floodplain development.

Nevertheless, without the construction of the wastewater treatment facilities, the construction moratorium would have continued and development would have been curtailed. Therefore, the provision of the wastewater facilities promoted new development which otherwise could not have occurred. None of the development promoted by the wastewater facilities is located in the floodplain.

Other federal programs, such as the construction of Hyrum Lake, have added to the amenities of living in the area but have not contributed to development pressures.

Hyrum,
Utah



Key:

1 - City park (HCRS)
2 - Oxidation ditch (EPA & FHA)
3 - Water reservoir (FHA)

▨- FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE LITTLE BEAR RIVER DRAINAGE BASIN, WELLSVILLE, UTAH*

The Town of Wellsville, Utah is a small community of about 1,800 persons (1978 estimate) located in northeastern Utah in the drainage basin of the Little Bear River. Wellsville is about nine miles south of Logan and is the county seat of Cache County. Cache County is the northwesternmost County in Utah. It is a rural, agricultural county with small towns scattered along U.S. Highway 91 which runs north-south through the middle of the County. Wellsville is located in the southwestern corner of Cache County.

Wellsville is a community of single-family homes on large lots, with many small farms within the Town's limits. Newer construction has been of smaller homes and mobile and prefabricated homes on subdivided farms.

Wellsville is located in the fastest growing area of Cache County. According to population estimates provided by the Bear River Association of Governments, the 1970 population of 1,267 increased to 1,600 in 1976, representing an increase of 26 percent in a seven-year period. A population of 2,489 is projected for 1980.

One rendering plant and two large meat packing plants are located in southern Cache County, each with its own wastewater treatment facility (lagoons). There are also nearby cheese processors. Utah State University, located in Logan, is one of the County's major employers. Hill Air Force Base, located about 40 miles south in Ogden, also provides employment for people in Wellsville, although agriculture continues to be the primary employment for residents.

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*Case study based on interviews with Mr. Bruce King, Executive Director, Bear River Association of Governments, Mr. Gale Larson, Valley Engineering, Inc. (engineers for Wellsville's collection and treatment facilities), Mr. Bruce Wright, Cache County Planner; Mr. Willard Hill, District Health Officer, Utah Department of Health; and Mr. Robert Holt, '208' Study Coordinator, Bear River Association of Governments, March, 1978.

Southern Cache County and Wellsville have been the fastest growing areas in the County for three reasons: (1) the availability of land suitable for development; (2) the availability of potable water; and (3) a generally favorable attitude toward growth by the community. Growth has occurred primarily through subdivision of large lots.

The floodplain in Wellsville runs from south to north. It is from 100 to 300 feet wide with steep banks and several "special flood hazard areas" (HUD-designation). There has been scattered, single-family home construction in the floodplain, especially in the southwestern quadrant of the Town between 300 and 600 South Streets. Several small subdivisions of 10 to 20 homes and other scattered single-family homes and a few mobile and prefabricated homes have been built in the southwestern area of the Town and within a mile of the Town limits.

Because the floodplain in Wellsville is relatively small and undeveloped and several significant federal actions have occurred elsewhere in the Town, the corporate limits of the Town were chosen as the study area.

The few federal actions which have taken place in Wellsville are listed below in chronological order:

Mid-1930's-Works Project Administration - a small sewage collection system was installed to transport sewage through the western and northwestern sections of Wellsville. The sewage was dumped untreated into the Little Bear River.

1970 - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - grant for construction of the Wellsville Reservoir in the southwestern part of the Town. The County built a park adjacent to the reservoir in the same year.

1974 - Sewer and Water Program, Farmers Home Administration, U.S. Department of Agriculture - construction grant for the expansion of the existing collection system in the southern and northeastern portions of the Town. Sewage was dumped untreated into Little Bear River.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of a lagoon in Wellsville to intercept sewage discharges.

1976 to date - '208' Areawide Water Quality Management Planning Program, U.S. Environmental Protection Agency - ongoing water quality planning program.

In addition, the Farmers Home Administration has been providing home mortgage guarantees since the mid-1960's.

The Town of Wellsville has had zoning and subdivision regulations since 1972. The regulations do not contain any special provisions for floodplain protection. The Bear River Association of Governments' '208' planning, conducted under contract to the State Department of Health for the Bear River Basin, will probably result in provisions for floodplain control which will be recommended to local governments for adoption.

The sewage lagoon, constructed with funds from the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency, was necessary to intercept raw sewage being carried to the Little Bear River. The sewage lagoon in 1975 was designed for a population of 2,500 persons in 1995. Recent trends indicate that this population will be reached by 1980.

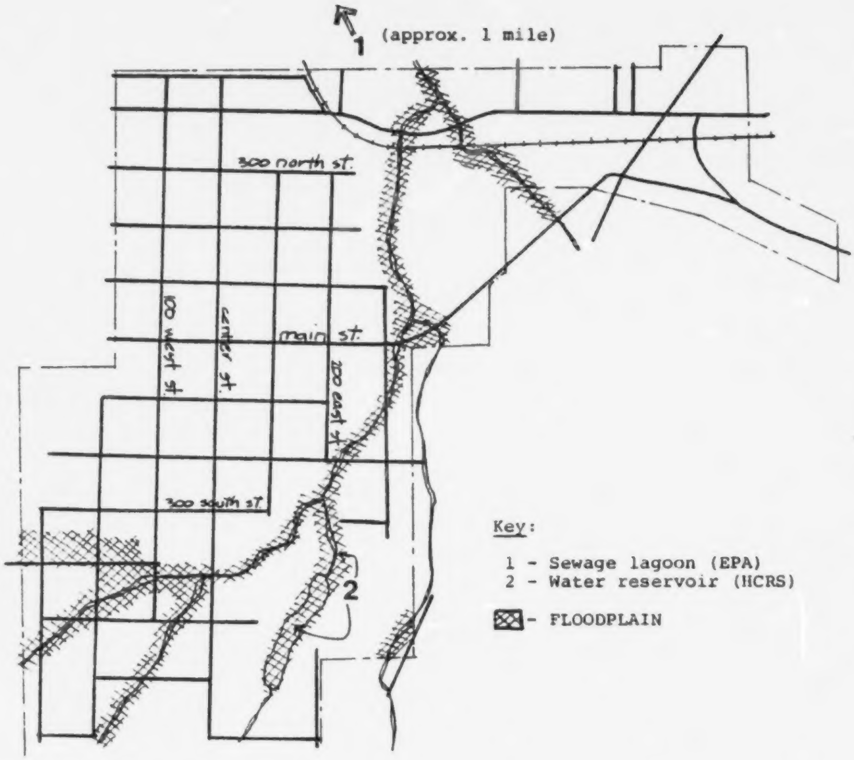
There has been a significant problem with FHA-financed housing in the area, according to the District Health Officer. FHA financing limits the size of the lot on which new housing is constructed. Initial financing is generally for 2- and 3-bedroom houses with the capability to expand later. Septic tanks are approved by the District Health Office based on the initial home sizes. Almost immediately upon construction, the owners expand their homes, often without a building permit. Septic tanks, sized too small, are overloaded; this problem, in turn, leads to a need for federal sewage construction projects.

This problem has been partially alleviated by the requirement by the District Health Office that septic tanks be sized for eventual expansion. This requirement is imposed by inspectors.

Persons interviewed unanimously agreed that wastewater treatment and collection facilities funded by the U.S. Environmental Protection Agency and the Farmers Home Administration have corrected a problem caused by growth. With the possible exception of Farmers Home Administration home financing, the growth was not stimulated by federal actions.

The provision of wastewater treatment facilities through federal construction grants has, however, allowed urban development to take place in locations where development would otherwise have been prohibited by natural conditions. Development has not taken place in the floodplain and federal programs have neither hindered nor encouraged floodplain development.

Wellsville,
Utah



CASE STUDY OF DEVELOPMENT IN THE CLARK FORK RIVER BASIN, MISSOULA, MONTANA*

The City of Missoula is located in Missoula County in western Montana. Missoula is the countyseat and is located at the confluence of the Clark Fork and Bitterroot Rivers and Rattlesnake Creek.

The chief industries of Missoula and the surrounding County are education (the University of Montana), manufacturing (especially lumber and wood products), government, wholesale and distribution, and tourism. The University is by far the largest single employer with 2,767 employees (1976), followed by Champion Building Products (lumber, pulp and paper) with 1,437 employees.

The City of Missoula population expanded at roughly twice the national average during the decade 1960-1970. In 1960, the population was 27,090; the population at present is estimated to be 33,000. The growth can be attributed to expansion of the lumber and related industries in the early 1970's, gradual increases in the number of employees at the University and in local governments, some retirement residences, and the natural attractiveness of this mountainous area.

The area around Missoula is laced with rivers, creeks and irrigation ditches. Waterways are often poorly defined and floodplains may range up to several thousand feet away from a river. Many areas are poorly drained, although the water table is typically low and the soil is permeable.

The area chosen for this case study is the City of Missoula. It constitutes the entire service area for the major sewage treatment facility in the County and includes virtually all major federal actions which have taken place in the area, except as noted in the text below.

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* Case study based on interview with Mr. Lud Browman, Mr. Fritz Thibodeau, and Mr. James Waltermire, Missoula County Commissioners; Ms. Gladys Elison, Executive Director, Five Valley Council of Governments; Mr. Orin Olsgaard, Missoula County Zoning Officer; and Mr. William Kendall,City of Missoula Engineer, April 5, 1978.

The floodplain in Missoula traverses the City from east to west along the Clark Fork River and for a short distance from north to south along Rattlesnake Creek. Within the City, the floodplains are well-defined as a result of extensive streambank improvements made over the past forty years. West of the sewage treatment plant, the floodplain widens to 2,500 to 4,000 feet on the north side of the Clark Fork River.

Within the City, the floodplain is generally far too steep to develop. The primary exceptions are in the center of the City on the south side of the Clark Fork River where the Intermountain Lumber Company and a city park are located. Extensive urban development, however, is located adjacent to the floodplain.

West of the sewage treatment plant on the Clark Fork River, houses have been constructed on the south side of the River in the floodplain and agricultural uses are situated in the floodplain on the north side. These homes were constructed with the expectation that a dike constructed by the U.S. Army Corps of Engineers would prevent flooding. The dike is frequently breached and the lands are officially within the floodplain as defined by the Federal Insurance Administration of the U.S. Department of Housing and Urban Development.

The Bellcrest area of the City is faced with extensive flooding problems. This southern portion of the City is laced with irrigation canals, originally constructed for agricultural purposes. As subdivisions were constructed in this area, diversion canals and ditches were inadequate to prevent annual flooding. Persons living in this area now experience basement flooding and serious erosion annually.

The Missoula Sewage Disposal Plant, constructed in 1964 with partial funding from the Farmer's Home Administration, and improved from 1973 until the present (continuing construction) with U.S. EPA Section 201 funds, is located just west of Reserve Road on the Clark Fork River. Constructed in a floodplain, the site for the plant was raised by two feet in 1964 to prevent flooding.

The plant presently serves only the City of Missoula. About 95 percent of the City is served and about 85 percent of the houses and businesses are connected. The treatment facility can potentially serve a large portion of Missoula County, since there will be about 4-5 mgd in excess capacity when finished. The City will not expand service without some county-financed improvements to the system.

There have been a number of federal actions in the study area. Several of them have occurred within and adjacent to the floodplain. These activities in chronological order are:

1920's-Soil Conservation Service, U.S. Department of Agriculture, and Bureau of Reclamation, U.S. Department of the Interior - financed construction of extensive system of irrigation and drainage ditches, some of which are in Bellcrest area.

1930's-Public Works Project for Flood Control, U.S. Army Corps of Engineers - constructed embankments in several places along Clark Fork River; embankments have been breached by river.

1930's through 1940's-Bureau of Reclamation, U.S. Department of the Interior - construction of watershed dams for creation of small reservoirs for water supply throughout area.

1964 - Sewer and Water Facility Loan and Grant Program, Farmers Home Administration - assisted in financing the construction of the Missoula Sewage Disposal Plant.

1968 to 1970 - Federal-Aid Highway Program, U.S. Department of Transportation - Interstate 90 was completed through Missoula, paralleling Clark Fork River for some distance.

1970 to 1971 - U.S. Army Corps of Engineers - studied measures to ameliorate flooding in Bellcrest area; no cost-effective measures to resolve problem were found.

1970 to 1975 - Public Works Project for Flood Control, U.S. Army Corps of Engineers - dikes and riprap constructed all along the north side of Clark Fork River through Missoula to prevent flooding; riprap extended north along eastern side of Rattlesnake Creek.

1970 to 1975 - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - funded improvements to several parks, particularly city park within floodplain on south side of Rattlesnake Creek.

1973 to date - '201' Wastewater Treatment Works Program, U.S. Environmentatl Protection Agency - financed construction of improvements to sewage treatment plant and addition of 5 mgd capacity to facility.

1973 - Federal-Aid Highway Program, U.S. Department of Transportation - Reserve Road Bridge spanning Clark Fork River was constructed; piers are at an angle to flow of River and are causing bank erosion.

1975 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - the City and County are participating in the program.

1977 to 1978 - Public Works Program, U.S. Economic Development Administration - financed additions to Missoula City Hall (under construction).

1978 - Section 8 Housing Program, U.S. Department of Housing and Urban Development - financed construction of housing for elderly adjacent to floodplain in center of Missoula, Clark Fork Manor (under construction).

In addition to these activities, the U.S. Forest Service has been continually active in allowing cutting on its lands. Early "clear cuts" contributed significantly to water quality problems; later policies prevented such problems.

The Soil Conservation Service funds local conservation districts to assist individuals in improving streambanks through the use of best management practices, adopted by the State Department of Natural Resources. The districts have been particularly active lately.

Missoula County has funded a '208' type study for $50,000 to assess water quality conditions in the urbanized areas. This study, due in the Fall, 1978, will probably show a need for the city's sewer system to be extended to some areas of the County. The County is also engaged in an extensive program of constructing culverts and ditches in one area near the City.

The designation of floodplain areas is important in Missoula. At present, the State Department of Health will not allow any new septic tanks to be constructed within 100 feet of a floodplain. This has prevented development of areas adjacent or within floodplains which are not sewered. Some of these areas were eligible for development until recent floodplain designation by the U.S. Department of Housing and Urban Development. Changes in the floodplain boundary occurred when dikes constructed by the Corps of Engineers were determined to be insufficient for floodplain protection.

Because the dikes constructed by the Army Corps of Engineers provide some flood protection, they have been a stimulus for development and have allowed development to occur. Because the floodplain boundary has been recently revised, some of the development allowed through the dikes is located in the floodplain.

As a result of the excess capacity in the wastewater treatment plant, areas in the floodplain can now be sewered. Development in the floodplain in the future, however, is not expected, since the City and County have strong floodplain regulations. Outside of the floodplain, the wastewater treatment facilities allow development to occur.[1]

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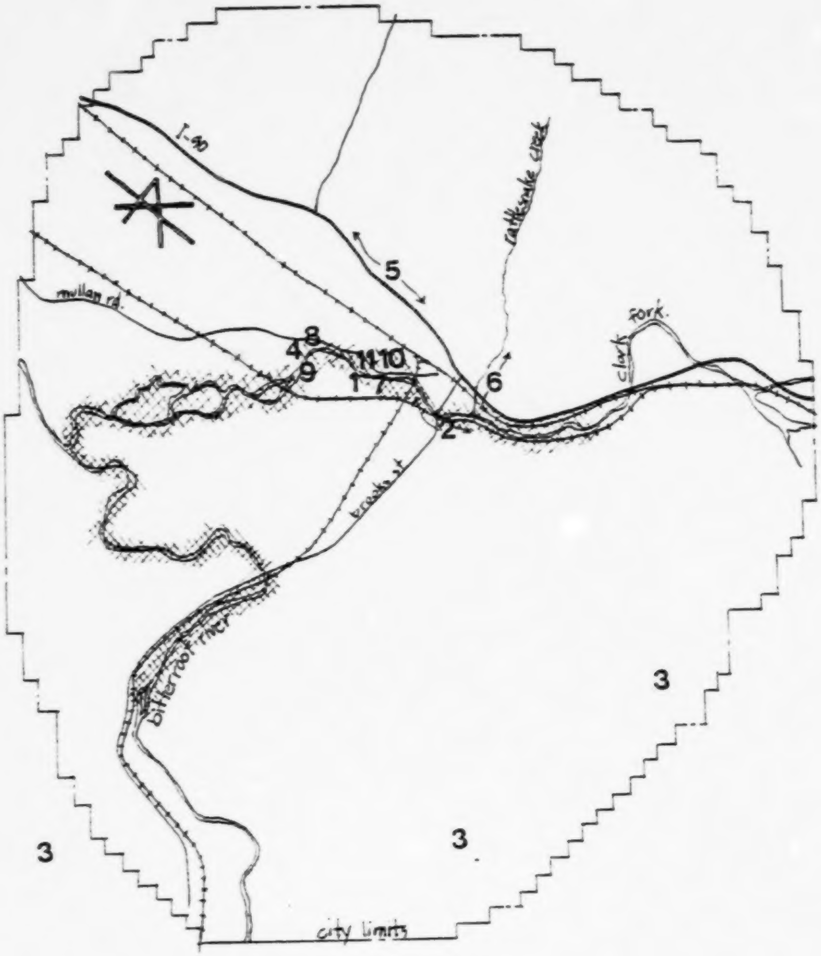
[1] Persons interviewed noted that the wastewater treatment facilities will allow development to occur which is in conformance with the comprehensive plan. At the same time, they noted that the increased growth will contribute to air quality problems.

Missoula,
Montana



Key:

1 - Irrigation and drainage ditch system in the Bellcrest area (SCS and BOR)
2 - Corps of Engineers flood control embankment on Clark Fork River
3 - Watershed dams for small reservoirs (Bureau of Reclamation)
4 - Missoula Sewage Disposal Plant (Farmers Home Administration)
5 - Interstate Highway 90 (DOT)
6 - Dikes and riprap for flood control on Clark Fork River and Rattlesnake Creek (Army Corps)
7 - City Park Development (PDR)
8 - '201' Sewage Treatment Plant improvements
9 - Reserve Road Bridge (DOT)
10 - City Hall Additions (HOD)
11 - Section 8 Housing (HUD)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT
IN
GRAND JUNCTION, COLORADO*

The City of Grand Junction is located at the junction of the State's two largest rivers, the Colorado and the Gunnison, in west-central Colorado. The City is the largest urban area in western Colorado and is the county seat for Mesa County.

Grand Junction is located primarily along the northern shore of the Colorado River, with the southernmost part of the City situated southeast of the Gunnison and Colorado Rivers' confluence. The City is primarily a service center for western Colorado and the ski resorts of central Colorado.

The primary sources of employment in Grand Junction and in Mesa County are trade, manufacturing and agriculture. Mountain Bell, the Denver and Rio Grande Western Railroad, and St. Mary's Hospital are the major private employers in the area. The Colorado State Home and Training School, Mesa County School District #52 and other federal, state and local governments are the primary public employers. The Department of Energy's URAVAN facility located south of the City is the single largest federal employer; extraction of rare minerals, uranium and vanium, is regulated there.

Grand Junction's population in 1960 was 18,694 and 20,170 in 1970. The Colorado West Area Council of Governments estimates that the current population (1978) of 26,168 will grow to 59,755 by the year 2000. Mesa County's current population is 72,882 and is expected to expand to 161,266 by the year 2000. Population growth in the City is moderate.

Most of Grand Junction's industrial development has occurred along the Denver and Rio Grande Western Railroad tracks, which roughly run parallel to the Colorado River along the southern edge of Grand Junction, as is shown on the attached map. There has been considerable attention given to the runoff from these industries into the Colorado and Gunnison Rivers by the State Department of Health during the past several years. Mill tailings and oil spills in parking lots are especially bad problems.

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* Information for this case study was taken primarily from an interview with Mr. John Ballagh, Departmental Planner, Long-Range, City of Grand Junction-Mesa County, March, 1978.

The 100-year floodplain which extends from approximately 22nd Road in the west to 32nd Road on the east of town, is the study area and runs from east to west along the Colorado River and south to north along the Gunnison River. The floodplain is approximately 100- to 200-feet wide on the north side of the Colorado River and much narrower on the steeper south bank. The floodplain along the Gunnison River is also about 100- to 200-feet wide on both sides.

The study area was selected because it includes the service areas of the existing 5.7 mgd wastewater treatment plant and the proposed 12.0 mgd plant at 22nd Road scheduled for completion by 1980.

The floodplain contains a number of warehouses and small industries on the north side of the Colorado River, between the river and the railroad tracks. Houses sit on the embankment which overlooks the steep south shore. Houses also line the west side of the Gunnison River, although there is little development in the areas on either side of the river which would be in the floodplain most subject to frequent floods. An irrigation lift canal runs parallel to the Gunnison River along its western bank for much of its length in Grand Junction.

Surprisingly, few federally-assisted activities have taken place in Grand Junction and vicinity. Those which have occurred include:

1911 - The Colorado National Monument was designated a national monument. This attraction is seen by approximately 600,000 persons each year and is located three miles southwest of Grand Junction. The Monument is operated by the National Park Service.

1919 - The Highline Canal, located northeast of the study area, and the Orchard Mesa Canal, located to the southeast, were constructed with assistance from the Department of the Interior.

1930's - The Civilian Conservation Corps constructed the National Monument Road, opening that attraction to the public.

1960's - Federal-Aid Highway Program, U.S. Department of Transportation - Interstate 70 was completed north of the City.

Early 1970's - Section 8 Housing Program, U.S. Department of Housing and Urban Development - The Walnut Park project was constructed.

1973 - National Flood Insurance Program, U.S. Department of Housing and Urban Development - A flood control ordinance was adopted by Mesa County in conformance with requirements of the National Flood Insurance Program. The City of Grand Junction is not included.

1973 - 1974 Land and Water Conservation Fund Program, Heritage Conservation Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation) - funding for the development of two small parks.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction grant to Grand Junction to improve the existing 5.7 mgd plant on the Colorado River.

1976 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - Grant for facility planning was begun covering the entire study area. These plans were recently completed.

1976 - present '208' Areawide Water Quality Management Program, U.S. Environmental Protection Agency - The Colorado West Area COG is performing planning in accordance with Section 208 and U.S. EPA guidelines under contract to the State Department of Health.

In addition, the Farmers Home Administration has insured mortgages of single-family homes to the east and west of the City since the 1960's.

According to the planners interviewed, federal programs have not been the stimulus for the growth and development of areas within the study area, although national environmental and energy-related policies may have indirectly contributed to some growth. The transportation and regulation of minerals has, no doubt, contributed to Grand Junction's growth as a service center for one of the largest mining areas in the country and concomitant population growth.

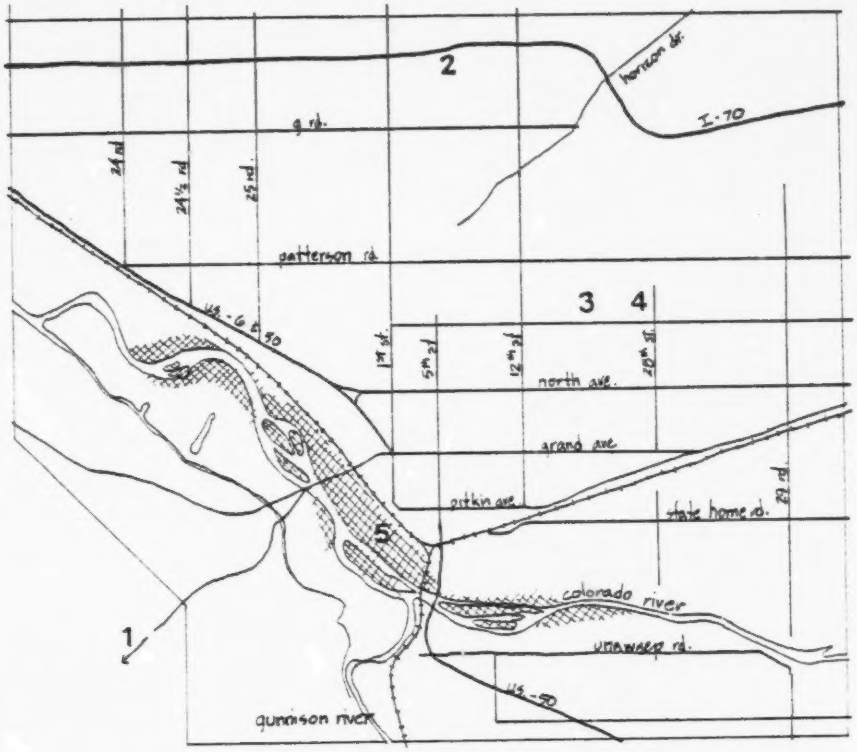
The intermittent development in the floodplain is largely a result of a lack of strong local land use controls and the natural attraction of the rivers since rivers flush away wastes from small industries with residues. The floodplain and vicinity on the north side of the Colorado River were adjacent to the railroad tracks and, consequently, were excellent staging areas for materials to be shipped and industries relying on this transportation.

The additions to the existing treatment plant and the proposed construction of an additional plant are remedial. These plants will serve existing residential developments to the west of the city which are currently on septic tanks or are served by private package treatment plants.

The overall density of development has not changed appreciably as a result of the additional sewerage facilities, although this may not be the case in the future. Large lots required by health officials for septic tank construction may now be subdivided, since wastes will be treated centrally.

In summary, the major problems in the floodplain are contributed by non-point pollutants from residues and industries to the north of the Colorado River. City-County planners had little hope that these problems would be corrected by regulations resulting from the '208' plan for the area.

Grand Junction,
Colorado



Key:

1 - Colorado National Monument and National Monument Road
2 - Interstate 70
3 - Section 8 housing
4 - City parks
5 - '201' wastewater treatment plant

(locations of the Highline Canal and Orchard Mesa Canal
are not shown)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE CITY OF DeSMET, SOUTH DAKOTA*

The City of DeSmet is a rural South Dakota farm community located approximately 75 miles northwest of the City of Sioux Falls.

Federal census figures establish DeSmet's population in 1950 at 1,184. The City experienced moderate growth in the fifties, growing to a population of 1,324 by 1960. Census data in 1970 and General Revenue Sharing estimates for 1975 indicate that DeSmet has not experienced significant population growth or decline since 1960.

DeSmet is essentially an agricultural community. However, in 1978-1974, an industrial park was developed in the City. Industries located in the park include: the Lyle Sign Co., manufacturers of metal road signs; Raven Industries, garment manufacturers; and, Central By Products, producers of bone meal. Employment at the industrial park totals 76. According to regional planners, the industrial park has stabilized the City's economy.

Several random and widely dispersed flow hazard areas have been identified in DeSmet. The majority of these are depressions which fill with water in the spring. The two isolated flood hazard areas in the northwest corner of the City (see attached map) are crossed by dedicated streets. The tracks of the Chicago and Northwestern Railroad also pass through a portion of one of the isolated flood hazard areas in the eastern part of the City.

The only significant flood hazard area within the corporate limits of DeSmet is associated with Silver Lake, which is situated to the south and southeast of the City. Silver Lake is a weed covered pasture in dry years. During wet periods the pasture is known to flood. The area subject to periodic flooding is not developed. Due to occasional wetness and recurrent field fires, development around Silver Lake is not anticipated.

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* Information for the case study was provided by Mr. Lowell Richards, Executive Director, and Mr. Thomas Holt, Regional Planner, First Planning and Development District, Watertown, South Dakota, February, 1978. Supplementary information on federal grant assistance was obtained in a telephone interview with Mr. B. A. Johnson, Finance Director, DeSmet, South Dakota.

The City of DeSmet is served by a three cell wastewater treatment facility completed in 1976. The facility replaces an Imhoff tank which had a design capacity of .05 mgd and was not meeting discharge requirements established by EPA. The new wastewater treatment facility is located east of the city limits near the flooding area of Silver Lake. The treatment plant was designed to be floodproof. The service area of the wastewater treatment facility has been selected as the case study for detailed examination.

Major federal construction funds received by the City of DeSmet are listed below in chronological order.

1920's-Construction of U.S. Highway 14.

1968 - Federal Housing Assistance Programs, U.S. Department of Housing and Urban Development - construction of Prairie Park moderate income housing units.

1974 - Airport Development Aid Program, Federal Aviation Administration, U.S. Department of Transportation - development and construction of an airport servicing the City of DeSmet.

1974 - Farmers Home Administration, U.S. Department of Agriculture - grant and loan for development of an industrial park.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of wastewater treatment facilities: 3 cell plants, force main, interceptor and outfall.

1976 - Sewer and Water Facilities Program, Farmers Home Administration, U.S. Department of Agriculture - water line, sewer line and road extension project.

1977 - Sewer and Water Facilities Program, Farmers Home Administration, U.S. Department of Agriculture - additional sewer line, water line and road extension projects.

1977 - Land and Water Conservation Fund Program, U.S. Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - construction of a rest station at Laura Smealls Wilders historic site.

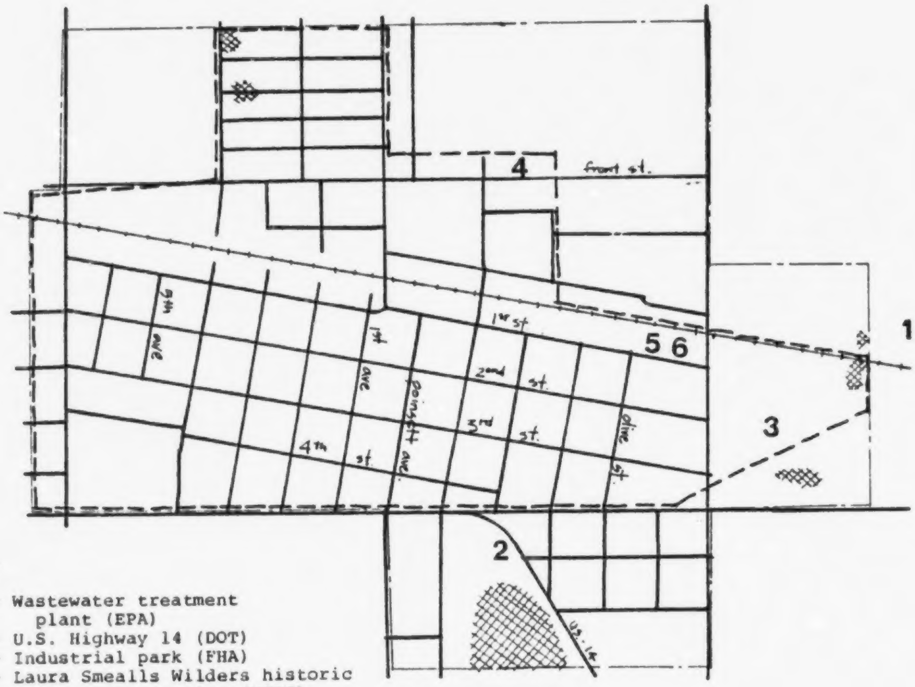
1977 - Land and Water Conservation Fund Program U.S. Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - development of a children's play area at East Park.

According to persons interviewed, the development of the airport north of DeSmet and the construction of the wastewater treatment facility had significant impacts on development in the City. The Farmers Home Administration, which awarded a grant/loan for development of the industrial park, based their funding decision partly on the availability of a wastewater system capable of treating wastes generated at the industrial park. The Lyle Sing Co. moved into the industrial park partly because of an air travel access made available by the airport, constructed largely through FAA funding assistance. Regional Planners agree that the industrial park has stabilized the economy of the City.

The wastewater treatment facilities have also made possible residential growth. As of mid-April, 1978, the City was close to annexing sizable land areas east, north and west of the City. Residences in these presently unincorporated areas are experiencing serious problems with septic tank systems. Following annexation, these areas will be tied into the sewerage system operated by DeSmet.

In summary, federal programs made possible through the '201' wastewater treatment facility have allowed industrial development and have made it possible for DeSmet to annex additional land. Federal funding assistance programs have stabilized DeSmet's economy but have not stimulated in-migration. The few scattered flood-prone areas within the City have not been developed.

DeSmet,
South Dakota



Key:

1 - Wastewater treatment plant (EPA)
2 - U.S. Highway 14 (DOT)
3 - Industrial park (FHA)
4 - Laura Smealls Wilders historic site rest station (HCRS)
5 - East Park play area (HCRS)
6 - Prairie Park housing (HUD)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT
IN
THE CITY OF HOWARD, SOUTH DAKOTA*

The City of Howard, South Dakota is a rural farm community located approximately 50 miles northwest of the City of Sioux Falls.

Federal census figures indicate that Howard had a population of 1,240 in 1950. In the ensuing decade, Howard's population grew to 1,333. However, the 1970 federal census figures show a decline in population to 1,112. 1975 estimates suggest that population in Howard is leveling near the 1970 figure.

The City of Howard is the County seat for Minor County. Since 1950, the County has also been steadily declining in population. The Economic Development Administration recognizes Minor as an economically depressed County.

The majority of the labor force in the City of Howard is associated with agriculture. The major industrial employers in Howard are Nordica, manufacturers of meat products, and Raven Industries, producers of garments. Raven is the only industry to locate in Howard in the past five years. The City issues about six building permits annually.

Flood hazard areas in Howard are associated with a small fork of the Vermillion River. The creek bed is dry except during periods of heavy rainfall and during spring runoff. The greatest threat of flooding in Howard occurs during winter months when downstream tributaries freeze, causing backwater floods.

The floodplain in Howard is given to many uses. Structures in the floodplain include a gas station and a scattering of farm houses. Other portions of the flood hazard area are open, devoted to grassland and a private golf course.

The City of Howard's wastewater treatment plant and collection system were installed in 1958. The City has been awarded a Step 1 grant to improve this aging and inadequate system which presently allows discharge into the Creek. As planned, facility improvements will expand the plant's capacity to prevent this discharge. The service area of the present wastewater treatment facilities has been selected as the study area.

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*Information for this case study was provided by Mr. Lowell D. Richards, Executive Director, and Mr. Mark Thomas, Regional Planner, First Planning and Development District, Watertown, South Dakota, February, 1978. Supplementary information on federal grant assistance to the City of Howard was provided by Mrs. Genevieve Zimmer, Deputy City Auditor, Howard, South Dakota in a telephone conversation March 29, 1978.

Federal funds received by the City of Howard are listed below.

1968 - Public Housing Program, U.S. Department of Housing and Urban Development - construction of low income housing units.

1972 - Land and Water Conservation Fund Program, U.S. Heritage Conservation and Recreation Service U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation), - irrigation system for golf course.

1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - facilities planning (Step 1) for improvements to wastewater treatment facilities.

1978 - Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation), - irrigation water supply well for golf course.

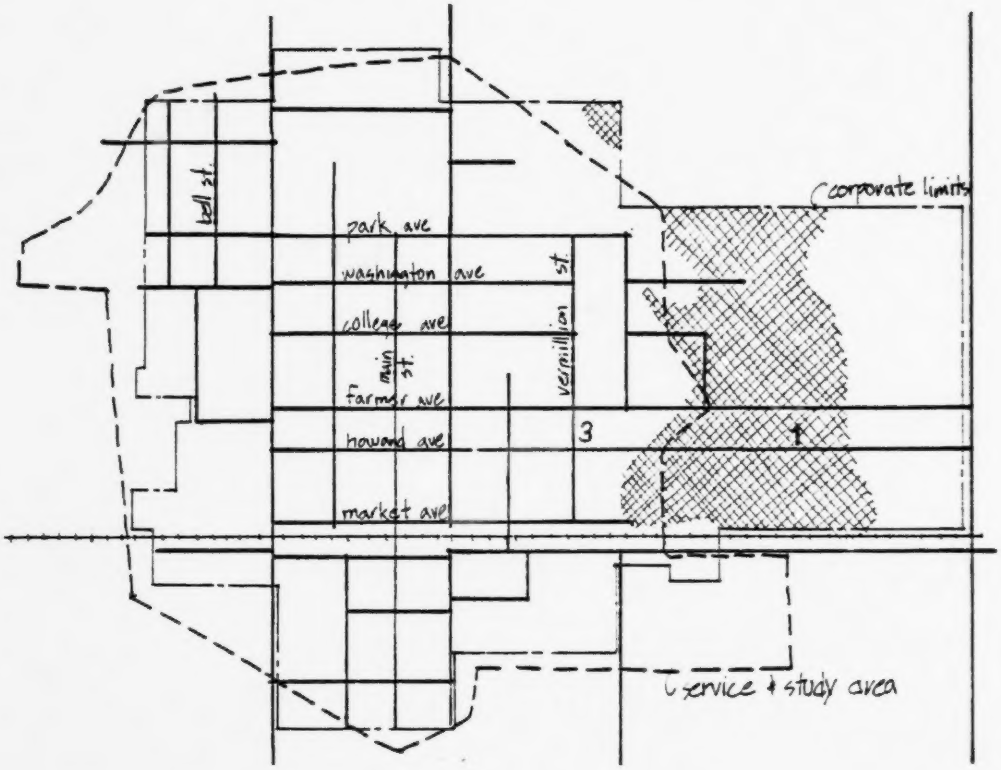
Zoning ordinances have not been adopted by the City of Howard. The City participates in the Emergency Flood Insurance Program administered by the Federal Insurance Administration, U.S. Department of Housing and Urban Development.

Regional planners see no relationship between growth and development in Howard and federal programs involving the City. The golf course which received federal funds for improvements is located in a flood hazard area, but the planners agree that such uses are to be encouraged and that the improvements have not generated additional floodplain development.

The regional planners indicated that a Step 3 wastewater treatment facility would be a potential growth stimulant, but only if the City were willing to annex additional territory. Presently, only 10 of the City's 640 total acres remain undeveloped. Annexations in the future, however, appear unlikely, since City officials believe that revenue derived from property taxes levied against newly annexed land would not sufficiently offset the costs of providing municipal services.

In summary, federal programs have not been a direct stimulus to growth and development in the City of Howard.

Howard,
South Dakota



Key:

1 - Golf course (HCRS)
2 - Wastewater treatment plant (EPA)
3 - Low-income public housing (HUD)

2

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN KEYSTONE, SOUTH DAKOTA*

Keystone, South Dakota is a rural community situated in the Black Hills, 18 miles southwest of Rapid City.

Federal census figures are not available before 1970. In 1970, the census indicated that Keystone had a population of 272. A state census taken in 1975 shows that Keystone's population had risen to 310.

Tourism is Keystone's major industry. Located in the Black Hills, the Town is noted for its natural as well as man-made attractions. Foremost among the attractions is the Mount Rushmore National Monument, located approximately one mile west of the Town boundary. Keystone also offers a tramway ride up one of the hills and guided tours of Rushmore Cove. Development in Keystone's two small commercial areas consist primarily of shops, restaurants and motels which cater to a large tourist trade during the summer season.

At one time, year-round residents of Keystone were primarily employed in the Town itself. More recently, the expansion of route 16 into a four lane highway has precipitated Keystone's development as a bedroom community to Rapid City. Further development is impaired, however, by two factors. First, other small rural communities offer a similar lifestyle without the seasonal congestion caused by the influx of summer visitors. Second, Keystone's growth potential is severely limited by its natural topography. Most of the land area within the corporate limits of Keystone is undeveloped and will remain undeveloped because of its rugged, wooded terrain. Development has largely been restricted to low areas along the seams of the hills. The steepness of the canyon slopes precludes extensive hillside development.

The floodplain in Keystone is associated with winding creeks which flow in the seams between the hills. Since development also occupies these low areas, most residential and commercial structures in Keystone are located in a floodplain. This point was tragically underscored in 1972 when rain swollen creeks inundated most of the community.

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* Information for this case study was provided by Mr. Van Lindquist, Executive Director, and Mr. Jack Olsen, Director of Physical Planning, Sixth District, Council of Local Governments, Rapid City, South Dakota, February, 1978. Supplementary information on federal grant assistance to the Town of Keystone was gained an a telephone interview with Mrs. Mary M. Grover, Finance Officer, Town of Keystone, South Dakota. Information on the Mt. Rushmore National Monument was received from Mr. Chuck Milliken, Supervisory Park Technician, in a telephone interview.

Keystone's network of winding floodplains has been selected as the case study area for detailed examination.

The Keystone-Mt. Rushmore Sanitary Sewer District installed a wastewater collection and treatment system in 1975. The facility is located east of the Town limits, approximately two miles from the main business area. Facility construction was prompted by State and County Health Department officials in response to the inadequacy of septic tanks in treating high volume summer wasteloads. Prior to construction of the wastewater treatment system, sewerage facilities were limited to dry wells and some septic tanks, which were generally associated with commercial rather than residential units.

The new wastewater treatment facility utilizes a two-cell aerated pond and a single-cell stabilization pond system designed for 1,670 people. The current permanent population of Keystone is only 370, but the plant was designed for peak flow summer periods when tourist activities provides an additional loading equivalent to 1,200 people.

Major federal construction funds received by the Town of Keystone are listed below in chronological order:

1933 to 1941	- National Park Service, U.S. Department of the Interior - development of the Mount Rushmore National Monument.
1972 and 1973	- Office of Emergency Preparedness, Executive Office - general clean up and public facility repairs resulting from 1972 flood.
1974 and 1975	- Federal-Aid Highway Program, U. S. Department of Transportation - expansion of Highway 16A.
1975	- '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of wastewater collection and treatment system.
1978	- Public Works Program, Economic Development Administration, U.S. Department of Commerce - expansion of Town Fire Hall.

1978 - Public Works Program, Economic Development Administration, U.S. Department of Commerce - replacement of roof on Keystone Community Hall.

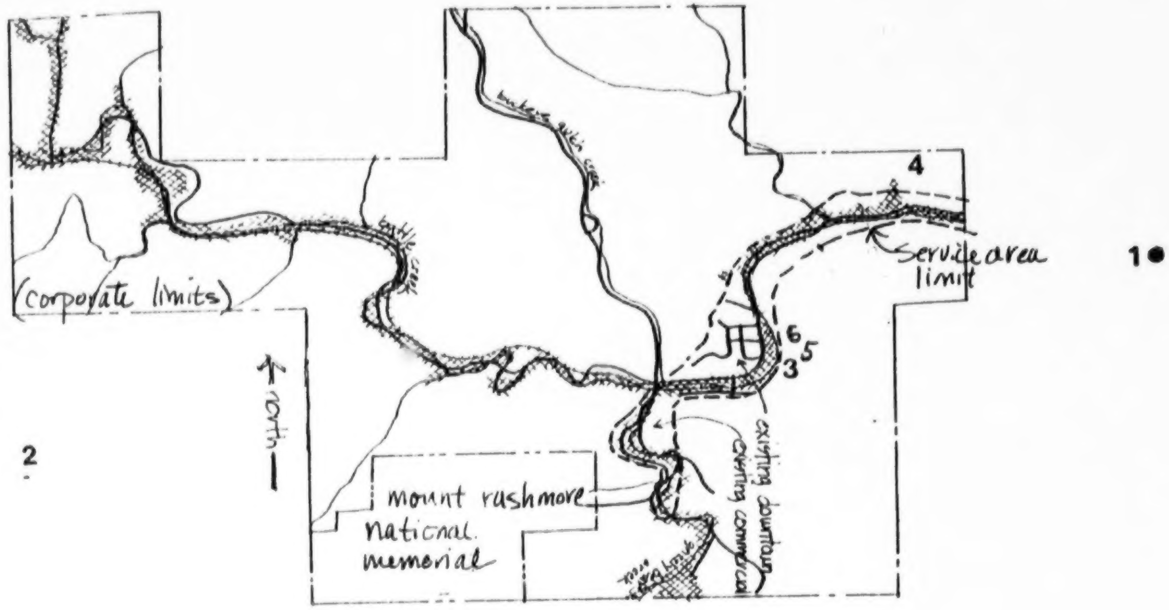
According to Mr. Jack Olsen, Director of Physical Planning at the Sixth District Council of Local Governments, Congressional appropriations to maintain the Mount Rushmore National Memorial insure a stabilized economy for the Town of Keystone. Without the Memorial, and its attendant tourist trade, Keystone would not be as developed as it is, and the Town would not attract as many tourists as currently visit each year. The shops, motels and restaurants which have spawned along Grizzly Bear Creek are definitely an indirect result of the Mount Rushmore National Memorial.

The wastewater treatment facilities funded by the U.S. Environmental Protection Agency allow existing commercial development to flourish without seriously impairing local water quality. However, regional planners do not believe the facility has stimulated growth and development in Keystone. Reasons given in support of this position include the limited capacity of the treatment facility in excess of present peak flows and a prevailing local attitude that community sewerage facilities are too costly and too urban. Other reasons relate to the fact that, even with a wastewater treatment system, commercial and residential growth is severely restricted by the diminishing number of canyonside parcels capable of being developed.

Since 1972, there has been considerable development in Keystone. Most of this development, however, can be traced to rebuilding activity associated with the 1972 flood and with fires which annually plague the community. Mr. Olsen feels it would be mistaken to associate this development with the construction of the wastewater treatment system.

In summary, almost all commercial and residential development in Keystone is located in a floodplain. Most of the commercial, and indirectly, most of the residential development in the Town exists because of the federally funded Mount Rushmore National Memorial located near the community. However, subsequent federal programs have not been a stimulus for growth and development in the community.

Keystone,
South Dakota



Key:

1 - Wastewater treatment plant (EPA)
2 - Mt. Rushmore National Monument (Natl. Park Svc.)
3 - Flood recovery (Office of Econ. Preparedness)
4 - Highway expansion (DOT)
5 - Town hall expansion (EDA)
6 - Community hall repairs (EDA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN THE TOWN OF MONROE, SOUTH DAKOTA*

The Town of Monroe is a small South Dakota farm community situated southwest of the City of Sioux Falls. The City is small and presently has a population of less than 500 persons.

Monroe, never very large, is gradually losing its population. In 1950, federal census figures indicate Monroe had a popula- of 160. Ten years later in 1960, the Town's population had decreased to 156. The gradual decline was also relfected in the 1970 census which established Monroe's population to be 134. 1975 population estimates prepared by the South Eastern Council of Governments again show a slight population decrease to 125 residents.

Although the total number of households increased from 62 to 65 between 1970 and 1975, a more indicative statistic is that household size in Monroe dropped during that same period from an average of 2.16 to 1.90. These figures confirm the conviction of the Regional Planners that Monroe is a "dying farm community."

Industrial expansion is the only possible factor which could reverse Monroe's population decline by stabilizing the local economy. However, there are only two minor industries in Monroe (a grain elevator operation and a construction company). Regional Planners doubt that more industry can be attracted to Monroe for several reasons: the Chicago and Northwestern rail line which presently passes through Monroe is being abandoned, the nearest airport is located miles away at Sioux Falls, and, there is no major highway network linking Monroe with the Sioux Falls area. The planners also feel that if rural communities like Monroe have no meaningful attractions in the towns, there is little chance for economic recovery.

Although an intermittent stream, which is part of the tributary systems of the Vermillion River, passes through the town, Monroe does not have any designated flood hazard areas. The floodplain of the intermittent streams is not developed.

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* Information for this case study was provided by Mr. David Queal, Physical Planning Director, South Eastern Council of Governments, Sioux Falls, South Dakota, February, 1978.

The wastewater treatment plant in Monroe consists of a two-cell, two-acre lagoon located southeast of the Town. This plant and an interceptor replaced on oxidation pond type treatment works installed as part of an FHA/EPA grant program in 1972. The improvements were made to meet EPA treatment and discharge requirements. Because the floodplain of the intermittent stream which passes through Monroe is undeveloped, the entire Town was selected as the study area.

The following federal programs, listed in chronological order, have occured in Monroe:

1972 - Sewer and Water Loan and Grant Program, Farmers Home Administration, U.S. Department of Agriculture - $20,500 grant and $64,700 loan for construction of a sanitary sewer collection system, oxidation pond and outfall.

1972 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - $10,000 grant for same project described above.

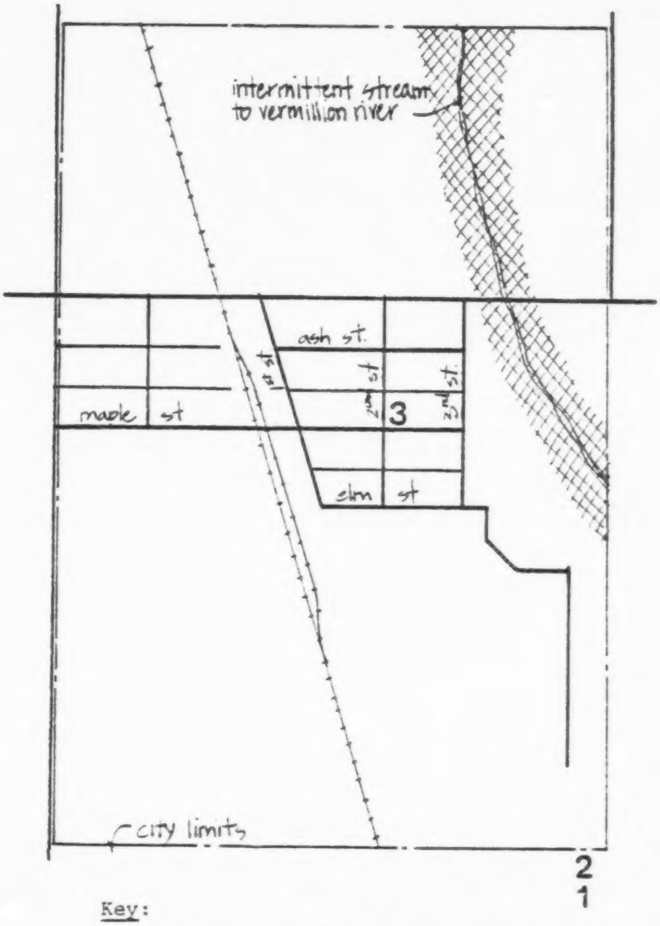
1975 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of an interceptor sewer extention and a two-cell, two-acre lagoon.

1976 - Community Development Block Grant Program, U.S. Department of Housing and Urban Development - grant for water treatment and storage improvements.

On the 1972 grant/loan application for a wastewater treatment works, local officials noted that the addition of a sanitary facility would encourage residential development. This has not really been the case. Although the federal water and sewer programs in Monroe have allowed for potential growth and have made development more attractive, they have not, to date, served as a growth stimulus. Even though the service area of the wastewater treatment facilities is the entire town, including the undesignated floodplain of the intermittent stream, development near the streambed has not occurred.

In summary, federal programs have had an influence on the quality of community life but have not been a stimulus to much needed growth and development.

Monroe,
South Dakota



Key:

1 - Wastewater treatment plant (EPA & FHA)
2 - Treatment plant replacement system (EPA)
3 - Water system improvements (scattered) (HUD)

▨ - FLOODPLAIN (not officially designated)

CASE STUDY OF DEVELOPMENT IN WASTA, SOUTH DAKOTA*

The Town of Wasta, South Dakota is a rural agricultural community located approximately 40 miles east of Rapid City.

Federal census figures indicate that Wasta's population has declined since 1960. In 1950, Wasta had a population of 144. By 1960, total population had increased to 196. 1970 census figures establish Wasta's population at 127, indicating a sizeable decline in population during the 1960's. Population estimates for 1975 indicate that Wasta's total population has continued to drop, but at a much slower rate than during the 1960's.

The majority of Wasta's residents are either actively engaged in agricultural activity or are retired farm people. The Town itself has no major businesses, except for a gasoline station, cafe, small grocery and campground. Wasta's residents make most of their necessary purchases in Rapid City, or in Wall, which is about 13 miles east along Interstate 90. The areawide '208' water quality management plan designates Wasta as a non-growth area.

The floodplain in Wasta is associated with the Cheyenne River which flows through the extreme southeastern corner of the Town. In this part of South Dakota, the floodplain is generally flat and supports little vegetation, except along the edge of the river where most soils promote tree growth.

More than one-third of the total land area within the corporate limits of Wasta is identified as floodplain. The floodplain is located exclusively on the south side of the Chicago and Northwestern rail line which bisects the Town diagonally. Residential and commercial development is, for the most part, restricted to the north side of the tracks, out of the floodplain. The exceptions include the Town's grain elevator, some stockpens and the wastewater treatment facility.

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* Information for this case study was provided in an interview with Mr. Jack Olsen, Physical Planning Director, Sixth District Council of Local Governments, Rapid City, South Dakota, Febraury, 1978. Supplementary information on floodplain characteristics and federal grant assistance was obtained in a telephone interview with Mr. Charles Bruce, President of the Wasta Town Board.

The Town of Wasta installed a wastewater collection and treatment system in 1976. Prior to construction, the Town was served by dry wells and scattered septic tanks. Septic tank problems were not common in Wasta. New facilities were primarily constructed to meet EPA treatment requirements.

The treatment facility utilizes a multi-cell stabilization pond designed for 200 people. The current population within the service area is 120. At present, the facility is nondischarging but may discharge to the Cheyenne River in the future.

Because there is little development in floodplain areas, the entire Town was selected as the study area.

The following federal construction programs have taken place in the Town:

1964 - Federal-Aid Highway Program, U.S. Department of Transportation - construction of Interstate 90 and interchange in the Town of Wasta completed.

1976 - '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency - construction of a complete collection system, interceptor sewer and 3.4 acre three - cell waste stabilization lagoon.

1977 - Public Works Program, Economic Development Administration, U. S. Department of Commerce - repairs and improvements to existing streets in Wasta by way of grading, leveling and patching.

The Town of Wasta does not participate in the Flood Insurance Program administered by the U.S. Department of Housing and Urban Development.

According to Mr. Jack Olsen, Director of Physical Planning for the Sixth District Council of Local Governments, federal programs have not been a stimulus for growth and development in the Town of Wasta.

Although an interchange provides access to Wasta from Interstate 90, most interstate traffic stops in nearby Wall. Recent figures indicate that 45 percent of the eastbound vehicles on Interstate 90 stop at Wall. Wall additionally captures 55 percent of the westbound traffic. Wasta, therefore, does not compete with Wall for service provision to highway motorists.

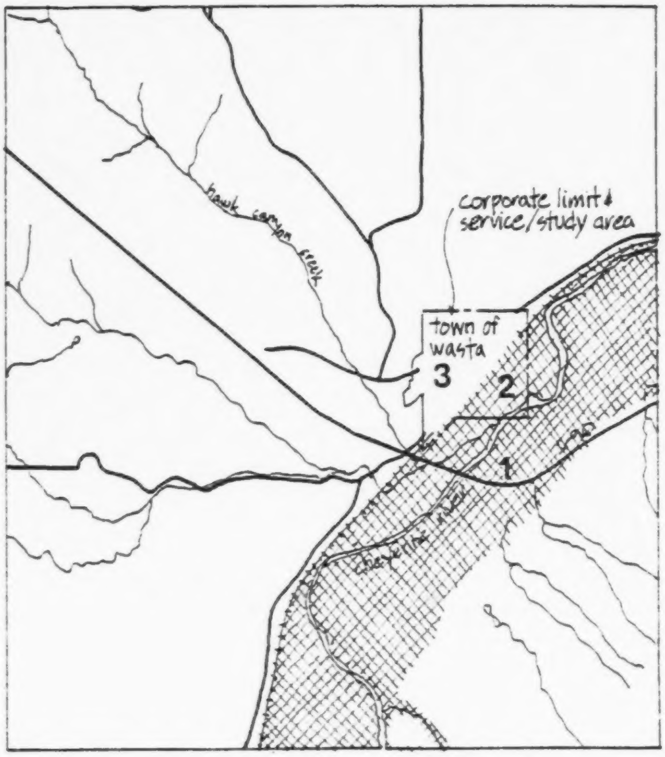
Situated 40 miles east of Rapid City, Wasta has not emerged as a bedroom community despite the highway access provided by the Interstate.

Although growth in Wasta is not anticipated, Regional Planners believe that any new development will occur in sections served by local streets and not in the southern floodplain where streets are not laid out. Recent federally funded street improvements reinforce the likelihood that any development that does occur will not take place in the floodplain.

The construction of the wastewater treatment system with funds from the U.S. Environmental Protection Agency has not affected growth and development since its design capacity is limited to a population of 200, and since there are few additional services available in the Town. Since the treatment plant was constructed, only one new home has been built in Wasta.

In summary, growth and development pressures are not being experienced in Wasta. If some growth should occur, it would likely follow the traditional pattern and take place north of the railroad tracks and out of the floodplain of the Cheyenne River. Federal highway programs have provided access to the Town and other federal programs have provided or improved local facilities but have not been a direct stimulus to growth and development.

Wasta, South Dakota



Key:

1 - Interstate 90 (DOT)
2 - Wastewater treatment plant (EPA)
3 - Street improvements (EDA)

▨ - FLOODPLAIN

CASE STUDY OF DEVELOPMENT IN RAPID CITY, SOUTH DAKOTA*

The City of Rapid City is located in Pennington County in western South Dakota. It is the center of economic activity for the southwestern part of the State.

The population of Rapid City was 13,844 persons in 1940. The following two decades were periods of great growth for the City. In 1950, the population was 25,310 and by 1960, it grew to 42,399. During the decade of 1960-1970, population growth rate in the city declined by 3.3 percent, resulting in a population of 43,836 in 1970. A 1973 estimate by the Bureau of the Census calculated Rapid City's population to be 47,210 and the Rapid City Planning Office estimated the population of Rapid City to be approximately 48,200 as of late 1975. There is little doubt that Rapid City will qualify for the Standard Metropolitan Statistical Area by both the county and city requirements by 1980.

Industry, government, tourism and mine-related activities play important roles in Rapid City's overall economy. The major sources of employment within the City are the Black Hills Power and Light Company; Magnetic Peripherals, a computer memory firm; Northwestern Bell Telephone Company; Regional Hospital; and South Dakota Cement Plant.

Ellsworth Air Force Base also contributes greatly to the economic base of Rapid City.

Tourism plays a significant role in the City's economy. For many years the Black Hills, the Badlands and Mount Rushmore have been major tourist attractions in western South Dakota. Situated near all of these attractions, Rapid City captures a large tourist trade, especially during summer months.

The floodplain in Rapid City is associated with Rapid Creek and some of its smaller tributaries. The Creek follows a course directly through the heart of the City, beginning in the extreme southwest corner and arching toward the southeast. Land adjoining the Creek is generally flat, treeless, and until the flood of 1972, heavily developed.

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* Information for this case study was provided by Mr. Van A. Lindquist, Executive Director, and Mr. Jack Olsen, Director of Physical Planning, Sixth District Council of Local Governments, Rapid City, South Dakota, February 1978.

The floodplain of Rapid Creek varies in width but averages about 1,500 feet. In eastern parts of the City the floodplain is approximately 2,500 feet wide. Since the land adjoining the Creek is flat, it was considered prime land for development. In June, 1972, heavy concentrated rains in the Black Hills caused the Creek waters to rise rapidly and overflow. Homes and businesses in the floodplain in Rapid City were destroyed, and 238 people lost their lives.

The wastewater treatment facilities at Rapid City were completed in 1967. Its designed capacity is 13.5 million gallons per day and is currently operating at 63 percent capacity. The present daily flow is 8 to 9 million gallons. In 1977, the City of Rapid City received an EPA grant for construction of a new interceptor. Federal monies were also used to repair and rehabilitate the parts of the system that were damaged during the 1972 flood. The treatment plant is located east of the City in the floodplain of Rapid Creek.

The wide band of floodplain stretching across the City has been selected as the case study area since it is in the area where federal flood recovery programs have been focused.

Major federal construction and planning funds received by Rapid City following the 1972 flood are listed below.

1972 to 1978 - Public Housing Program, U.S. Department of Housing and Urban Development - construction of public housing including:

- 122 family units;
- 56 units for elderly;
- 37 units for disabled; and
- 2 high-rise buildings for the elderly.

1972 - U.S. Department of Housing and Urban Development - extension of water and sewer lines.

1973 - Local Public Works Program, U. S. Economic Development Administration - project to make Lombardy Industrial Park floodproof.

1973 - Land and Water Conservation Fund Program, U.S. Heritage Conservation and Recreation Service (formerly the U.S. Bureau of Outdoor Recreation) - city parks improvement project.

1974 to 1977 - Federal Land and Water Conservation Fund Program, Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - development of bike trail network.

1975 - Local Public Works Program, Economic Development Administration, U.S. Department of Commerce - construction of exhibition building at the county fairgrounds.

1975 - Economic Development Administration, U.S. Department of Commerce - $150,000 grant for continuation of floodway clean-up program.

1975 to 1976 - Federal-Aid Highway Program, U.S. Department of Transportation - highway construction and repair.

1977 - Local Public Works Program, U.S. Economic Development Administration - grants for repair of Meade Street drainage system and overall water system rehabilitation.

1977 - Local Public Works Program, U.S. Economic Development Administration - construction of parking lot at the Civic Center.

1977 to 1978 - Federal-Aid Highway Program, U.S. Department of Transportation - reconstruction of bridges.

1978 - Federal-Aid Highway Program, U.S. Department of Transportation - $2.5 million grant for highway construction.

1978 - Flood Control Project, U.S. Army Corps of Engineers - construction of a dike along a section of Rapid Creek.

1978 - Land and Water Conservation Fund Program, U.S. Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) - development of Memorial Park.

1972 to 1978 - Urban Renewal Program, U.S. Department of Housing and Urban Development - land clearance and acquisition funds provided for floodplain lands ($64 million program).

As evidenced by the above listing, with the flood disaster of 1972, sizable amounts of federal aid were channelled into Rapid City. According to Regional Planners, this stimulated construction and new development and the spin-off effects from these expenditures were also sizable. However, growth has not been stimulated in the floodplain which is the study area for the case.

Two federal programs, the Urban Renewal Program and the Land and Water Conservation Fund Program, have been used to discourage further floodplain development. The Urban Renewal Program was important because of the large amount of funding provided (75 percent of the $64 million project was funded by the U.S. Department of Housing and Urban Development). The Rapid City Council is presently considering dedicating cleared portions of the floodplain as an urban park.

This renewal activity established a development trend in Rapid City. Redevelopment of the downtown core is planned with revamped buildings forming a small shopping mall. Industrial parks have also been developed in the Rapid City area in the past few years. Lombardy Industrial Park was designed to relocate business from the urban renewal area. Some businesses have relocated and more are planning to relocate. Another industrial park initiated by the Rapid City Chamber of Commerce, the Rapid City Economic Development Foundation Industrial Park, is also complete and ready for industrial prospects. This new industrial park was constructed to expand and attract business into the Rapid City area.

Much of the development activity occurring in Rapid City since 1972 has been concerned with replacing businesses and homes destroyed in the flood. The Regional Planners note that there has been additional growth, but find it difficult to assess how much of the growth can be attributed to federal renewal and flood recovery programs. Their conclusion is that federal programs have contributed to the growth and development of Rapid City to a substantial but indeterminate extent.

The Land and Water Conservation Program has provided funds for the purchase of parkland in the floodplain and has therefore provided a direct alternative to growth and development. The Program has been a part of the total floodplain management effort which followed the disastrous flood.

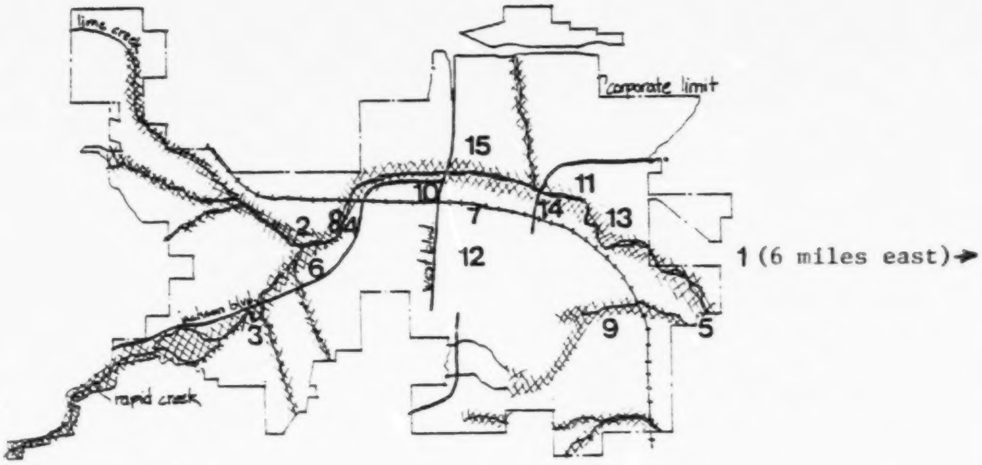
Federal programs have obviously had a significant impact on the location of growth and development in Rapid City. Whereas formerly growth was allowed to occur in the floodplain of Rapid Creek, development is now being shifted elsewhere. Businesses and residences which once occupied the floodplain are also being relocated to the extent feasible. Major exceptions include the Hubbard Mill, the Civic Center and Central High School. The floodproofing of Central High School and the Civic Center was accomplished as part of the City's disaster recovery and urban renewal program.

Following clean-up and initial recovery efforts, the thrust of federal programs in Rapid City was to purchase property along Rapid Creek so that future floods would pose little damage to structures and cause no loss of life. Planners assert that this effort was costly, but very successful. Their unanimous feelings were that Rapid City is a textbook example of how federal programs can be used to preclude floodplain development.

It is interesting to note that the dike constructed by the U.S. Army Corps of Engineers in 1978 has not had an effect on growth and development although it does protect the floodplain. Following the flood, there were few structures to protect. Left in the floodplain, the dike presently provides protection for parks and open space areas.

In summary, federal programs allowed Rapid City to recover from a disastrous flood and additionally stimulated some new growth and development outside of the floodplain. Federal programs were significant in their impacts on the location of new development. Most important, federal programs allowed local officials to purchase floodplain land to reduce the damage from any future floods.

Rapid City,
South Dakota



Key:

1 - Wastewater treatment plant (EPA)
2 - Bicycle trail (HCRS)
3 - Municipal golf course (HCRS)
4 - Civic center parking (EDA)
5 - Lombardy industrial park (EDA)
6 - Dike construction (Army Corps of Engineers)
7 - Storm drainage, sewer and water lines (scattered) (HUD)
8 - Floodway clean-up (scattered) (EDA)
9 - Water system rehabilitation (EDA)
10 - Highway construction (DOT)
11 - Park improvements (scattered) (HCRS)
12 - Low-income elderly housing (HUD)
13 - Fairgrounds exhibit hall (EDA)
14 - Bridge construction (DOT)
15 - Road construction (DOT)

▨ - FLOODPLAIN